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148
52

PROPER USE OF IRON, LIVER EXTRACT, VITAMIN B_{12}, AND FOLIC ACID IN ANEMIAS

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In the past 25 years the methods of treating the anemias have undergone striking changes which have made necessary, attention to accurate classification and grouping of patients. It is interesting that thinking in regard to the use of iron should have changed so radically at approximately the same time that treatment with liver was introduced, yet this change was the natural outcome of the extensive research carried on by Whipple and his associates and many other workers in the field. It was probably only natural, too, that after demonstration of the amazing response of pernicious anemia to liver this material should be tried in other types of anemia.

The introduction of liver extract and desiccated hog stomach for oral use and, later, of extracts for parenteral use further accelerated the tendency of members of the medical profession to use many different preparations in the treatment of anemia without paying much attention to whether the treatment was basically sound or had a background of proved practical merit.

The production of certain liver-stomach concentrates in combination with other medicaments and the exploitation of these preparations through the detail men of certain pharmaceutical houses have led to a tremendous expenditure of money from which little if any benefit has been derived. Although some benefit may have been obtained from some of these products, the substitution of other simpler preparations would have resulted in the same benefit at a 10th or a 20th of the cost.

Consider the position of the medical profession if a nationally distributed magazine should choose to present the evidence concerning the value of some of these widely promoted combination preparations that lack the stamp of approval of the Council on Pharmacy and Chemistry of the American Medical Association, preparations that are being passed on to the public by the medical profession without adequate scientific evidence of their therapeutic value. Accurate figures as to cost of these preparations are not available, but it has been estimated that their sale value for the year 1948 was 31 million dollars.

Among hematologists generally, the use of preparations of this type is much decried, and in the past several years several editorials have expressed disapproval of treatment with such preparations. Yet the literature of today is replete with instances in which mixed treatment consisting of preparations of iron and the various preparations of liver or liver and stomach are being used. It has become a common experience to see patients who have recently been treated with preparations of liver and of stomach, alone or in combination, who by no stretch of the imagination could be considered to have been anemic. Except possibly in some unusual situations the treatment of anemia depends on the use of specific substances according to the blood picture.

USE OF IRON

Indications.—From the purely practical standpoint of treatment there should be no question as to what preparation should be used in all but a small fraction of the cases of anemia. The great bulk of all the anemias amenable to treatment fall in the group of iron deficiency or hypochromic anemias, in which the anemia has developed as a result of loss of blood or inadequate intake or inadequate absorption of dietary iron from the gastrointestinal tract. Relatively few cases belong in the last two groups, the great majority being due to loss of blood. Moore [1] has recently made "idiopathic hypochromic anemia" the subject of an editorial. He pointed out that, although it may require two or three years of observation to demonstrate the cause of the iron deficiency, if each patient is adequately observed over a long enough period, the cause can be explained, and for this reason the term "idiopathic hypochromic anemia" should be deleted from medical literature.

Preliminary Considerations.—A preliminary to consideration of the use of iron as a therapeutic agent is careful investigation of the anemic patient. Anemia is a symptom, not a disease; thus, when the physician prescribes treatment for anemia without ascertaining the cause, he is perhaps indulging in dangerous symptomatic treat-

From the Division of Medicine, Mayo Clinic.
Read before the General Scientific Meetings at the One-Hundredth Annual Session of the American Medical Association, Atlantic City, June 12, 1951.
1. Moore, C. V.: "Idiopathic" Hypochromic Anemia—An Obituary, Blood **5**: 876 (Sept.) 1950.

ment. In generations past the practice of prescribing iron for patients who complained of weakness or fatigue was so commonplace that in the mind of the laymen these two symptoms were and still are almost synonymous with anemia. A careful evaluation of nutrition and growth up to and including puberty, systematic inquiry into the amount of blood lost with menses, rapidly recurring pregnancies or miscarriages, and detailed information as to possible loss of blood by any other route must be obtained. This information, of course, is acquired in taking a good general history, and in the presence of hypochromic anemia it becomes especially important. In women the problem is frequently easily solved by the history of menorrhagia, but, in the absence of excessive flowing, the problem in the female, just as in the male, becomes one of excluding by all possible means the presence of a bleeding lesion.

It is probably well at this point to interpose a few statements regarding the metabolism of iron.

It is estimated that a well-balanced diet in northern United States contains 10 to 12 mg. of iron daily. All of this iron, however, is not available for conversion into hemoglobin. Earlier estimates gave the maximal possible absorption at about 50% of the total iron contained in the diet. It seems likely that this figure is rarely attained. Granick [2] recently estimated that absorption was more likely to be in the range of 0.5 to 1.5 mg. of iron per day. Furthermore, the daily rate of absorption is inconstant even when the need for iron is great. Present and past studies have shown that absorption of iron occurs in a cyclic manner. Absorption normally occurs in the first few inches of the duodenum, and experimentally this phenomenon can be demonstrated by the staining of ferritin granules in the mucosal cells. These cells can reject iron, but the exact mechanism controlling this action is not well understood. For normal persons the maximal excretion of iron, as the result of wear and tear on iron-containing cells, is probably 1.0 mg. per day. Even with oral administration of pure soluble ferrous salts, the form in which iron is absorbed from the gastrointestinal tract, only a relatively small portion of the iron so administered is absorbed. However, iron salts given intravenously are converted quantitatively into hemoglobin. In general, iron so given is retained tenaciously by the body, although a small proportion may be excreted in the urine as demonstrated recently by Scott and Govan.[3] In the older literature the observation is reported that the concentration of hemoglobin of patients who have had a severe loss of blood improves at an average rate of approximately 1% in four days when the diet is good. If it is assumed that 50% of the average quantity of 12 mg. of iron in the diet is absorbed per day, then this increase of 1% in the concentration of hemoglobin would require utilization of approximately 25 mg. of iron. In spite of recent observations that the amount of iron absorbed may not be nearly as great as originally thought, it has been found, on administering iron intravenously, that dosage of iron calculated on this basis (25 mg. for each 1% deficit in hemoglobin) gives on the average an increase of hemoglobin that closely approximates this theoretical value.

Physiologically the periods of greatest need for iron are (1) in infancy, (2) during puberty, (3) to replace iron lost through menses, and (4) during pregnancy and lactation. Aside from these periods, only sufficient iron is needed to replace that lost through wear and tear. The appearance of a hypochromic anemia in a male after the period of growth is completed or in the female after the climacteric demands an explanation on the basis of some type of loss of blood.

Morphologically the chief characteristic of iron deficiency anemia is hypochromasia. Often there is a well-defined microcytosis, but the cells may vary from microcytic to normocytic. Although achlorhydria may be found and is a common accompaniment of a certain group of anemias of women during menstrual life, in the ordinary case of iron deficiency anemia, absence of free hydrochloric acid can be expected to occur with the same frequency that it would be expected in any other group of persons.

Oral Administration.—After the cause of the iron deficiency is determined, whether from loss of blood or for a nutritional reason, the problem of treatment must be considered. This has two aspects: (1) elimination of the underlying process if feasible and (2) specific therapy to relieve the iron deficiency. The first aspect is beyond the scope of this paper. The latter consists in the administration of simple ferrous salts by the oral route. Ferrous sulfate, carbonate, or gluconate are among those most commonly used, and these are given in a dosage of 15 to 30 grains (1 to 2 gm.) daily. Regardless of the type of preparation, some persons will show a sensitivity to iron salts, the commonest reaction being gastrointestinal irritation with gaseous distention, occasionally pain, and in some instances diarrhea or constipation. In some this reaction is so severe that therapy must be stopped. One way in which these reactions may be minimized is to start administration with only one 5 grain (0.3 gm.) tablet per day and increase to the full dose over a period of a week. By giving the iron with the meal, reaction may be avoided at times. To follow the response to iron, just as the response to treatment of pernicious anemia, the percentage of reticulated erythrocytes can be determined; the peak of the response comes between the 8th and 12th or 14th days after initiation of treatment.

Although dilute hydrochloric acid has been recommended for persons with achlorhydria who have not responded well to oral administration of iron, there is no clear-cut evidence to suggest that this substance increases the absorption of iron. A well-balanced diet with adequate high quality protein should, of course, be used. However, for iron deficiency anemia there is no recognized indication for the administration of liver extract (orally or parenterally), and the administration of the iron-liver-stomach combinations that are prescribed so commonly can serve only to increase the cost of medication without effecting regeneration of blood in any way except by their content of iron. With all the publicity given to medical subjects today, the patient knows that liver and stomach are used in treatment of the anemias. Lacking, however, the discernment necessary to dis-

2. Granick, S.: Iron Metabolism and Hemochromatosis, Bull. New York Acad. Med. **25**: 403 (July) 1949.

3. Scott, J. M., and Govan, A. D. T.: Anaemia of Pregnancy Treated with Intravenous Iron, Lancet **1**: 367 (Feb. 17) 1951.

tinguish between the various types of anemia, the medical public is today being sold a bill of goods.

As already mentioned, the response of reticulated erythrocytes serves as an index of the response to therapy with iron. Too often iron therapy is continued for an indefinite period, sometimes extending over years without any improvement on the part of the patient. Often, too, iron is administered to women, particularly those who have hemoglobin within the limits of normal and who cannot be expected to give any response. For women who have anemia on the basis of simple menorrhagia and for whom no surgical procedure is indicated, the use of iron for an indefinite period to maintain normal values of hemoglobin is indicated, although such patients should be observed from time to time to be certain that no other pathologic conditions are developing.

When massive hemorrhage has caused depletion of stores of iron, it seems reasonable to continue the therapy with iron for a considerable period after the return to normal in order that reserves of iron may be returned to normal. As yet, sufficient data are not available to permit determination of the period of time required for restoration of such stores of iron.

Parenteral Administration.—A small percentage of patients who have an iron deficiency anemia, for one reason or another do not tolerate or respond to oral administration of iron. These include patients who may be sensitive to iron or who have severe gastrointestinal symptoms after its oral intake or who, according to some observers, fail to absorb iron. Within the past few years satisfactory preparations of saccharated iron oxide have been developed which can be administered intravenously with safety and to which there is gratifying response. Formerly the disadvantages of parenterally administered iron were the toxic reactions that occurred in many of these patients. The possibility of toxic accumulations of iron from long-continued administration has not been sufficiently explored for the possibility of serious end results to be excluded entirely. The tendency to substitute intravenous iron therapy at high cost for oral treatment at nominal expense for a large group of patients who can and will make a satisfactory response to iron given by mouth is undesirable and should be guarded against. English observers recently have questioned whether iron should ever be administered intravenously in doses of more than 100 mg. per injection.

Brown and associates [4] have recently reported their experience with intravenous use of preparations of this kind. By a simple formula proposed by them, the amount of metallic iron can be easily calculated and allowance can be made in addition for iron storage depots. Injections can be given once or twice daily. My colleagues and I have followed the formula of allowing approximately 25 mg. of metallic iron for each 1% deficit in the hemoglobin. The response to this treatment can be followed by frequent determinations of the percentage of reticulated erythrocytes. The peak of the response occurs between the 6th and 12th days after treatment is instituted. The increase in the concentration of hemoglobin and subjective improvement, indicated by a feeling of general well-being, occur surprisingly rapidly. Reactions are mild and infrequent.

LIVER EXTRACT THERAPY

Since the introduction by Minot and Murphy [5] of liver therapy for pernicious anemia, in 1926, many materials have been produced that have simplified for both the patient and the physician the treatment of this disease. Physicians sometimes lose sight of the fact, however, that the end result of treatment has not been improved on and that whole raw liver gave the patient the same beneficial result as the most potent liver extract on the market today. Just to refresh memories, I should like to mention some of the materials used in the past 25 years. Whole liver, raw or cooked, was soon followed by the production of fraction G of Cohn, the latter being given as an extract for oral use. Within a short time after the introduction of this extract and as a consequence of the work of Castle, desiccated hog stomach was utilized. This was followed by liver extracts for parenteral injection, so-called crude and refined, dilute and concentrated. For the past 18 to 20 years liver extracts for intramuscular use have dominated therapy; liver extracts for oral use, desiccated defatted hog stomach, or liver-stomach concentrates have contributed only a small amount to the total treatment of pernicious anemia. With this long period of use of liver extracts behind us, the present is an excellent time to evaluate what these preparations will do in control of the symptoms of pernicious anemia.

Parenteral Administration.—After the diagnosis of pernicious anemia has been firmly established, treatment can be reduced to a relatively simple formula by dividing the cases into (1) those in which anemia is the primary finding and in which there are no neurologic symptoms or findings and (2) those in which neurologic symptoms are present with or without anemia. For many years I have treated patients in group 1 by giving them intramuscularly 1 cc. of a 15-unit preparation daily for three days and then 1 cc. weekly until the erythrocyte count had reached a normal level. After this the interval between injections is gradually increased to three weeks, and then the patient is asked to have the hemoglobin checked and erythrocyte counts at intervals of four to six months. Patients are warned that a decrease in the value for hemoglobin and in the erythrocyte count or the appearance of glossitis, paresthesias, or diarrhea indicates inadequate treatment and that either the amount of injectable material should be increased or the interval between injections decreased. Likewise the patient is warned that active infections, such as pneumonia and infections of the urinary tract, require administration of increased amounts of liver extract as a rule.

For the patients in group 2 a somewhat different plan is outlined. In this group are patients who have varying degrees of neurologic involvement, from mild to extremely severe. When liver therapy was first introduced, the response of neurologic symptoms was not entirely satisfactory, until as a result of work done by Longcope and associates [6] it was realized that two or three times

4. Brown, E. B.; Moore, C. V.; Reynafarje, C., and Smith, D. E.: Intravenously Administered Saccharated Iron Oxide in the Treatment of Hypochromic Anemia; Therapeutic Results, Potential Danger and Indications, J. A. M. A. **144**: 1084 (Nov. 25) 1950.

5. Minot, G. R., and Murphy, W. P.: Treatment of Pernicious Anemia by a Special Diet, J. A. M. A. **87**: 470 (Aug. 14) 1926.

6. Baker, B. M., Jr.; Bordley, J., III, and Longcope, W. T.: Effect of Liver and Liver Extract upon the Symptoms and Signs Referable to Nervous System in Pernicious Anemia, Minnesota Med. **13**: 815 (Nov.) 1930.

the maintenance dose or even more had to be given to bring about satisfactory improvement. Thus, when the first extracts for parenteral injection were introduced, experience already had shown that hematologic maintenance doses would not be sufficient for the treatment of patients with neurologic manifestations of pernicious anemia. Therefore, treatment of these patients is started as is treatment of patients in group 1, that is, 1 cc. of a 15-unit preparation of potent liver extract is given daily for three days and then 1 cc. of a 15-unit preparation is given every five to seven days. The latter dose is continued for two months and then, as suggested by Strauss [7] many years ago, the patient's condition is reconsidered. If the patient is making adequate progress, treatment is continued as in the initial plan; but, if the patient has not shown evidence of betterment, either the interval between injections is decreased or the amount of liver extract per injection is doubled. With many other observers my colleagues and I have found use of physical therapy and of coordinated exercises helpful adjuncts in the handling of this group of patients. The rapidity of improvement of patients in this group varies a great deal, and we have seen some patients who continued to improve for as long as 18 to 24 months after the initiation of therapy. A small group of patients will not obtain benefit, and the improvement of another small group will fall short of that which could be desired. We have not seen progression of symptoms occur in any patient receiving adequate therapy even though no improvement may be evident. Maintenance therapy in this entire group after either complete relief or after a prolonged period in which further improvement is not made should be carefully supervised.

For the past 20 years, we have not prescribed dilute hydrochloric acid for these patients. We have not been impressed at any time that patients with pernicious anemia have benefited by such administration and, as a matter of fact, seriously question whether dilute hydrochloric acid should be prescribed for any patient at any time.

Aside from what is advocated as a good adequate diet, no special vitamin supplements, including vitamins B_1 and C, have been prescribed for the treatment of pernicious anemia. Since for many years we have believed that patients with pernicious anemia are more susceptible to carcinoma of the stomach than the normal population, we have advocated yearly roentgenoscopic examination of the stomach and warned patients of the desirability of immediate roentgenoscopic examination if symptoms develop at any time in the interval between these examinations. Other competent observers in the field are at variance with this advice and recommend more frequent roentgenoscopic examinations. However, it has seemed to us that yearly examination is a practical approach, and in advising more frequent examination there is danger that the patient will avoid the examination entirely rather than submit to the expense of an examination the need for which it is difficult for him to understand.

7. Strauss, M. B.: The Pharmacopeia and the Physician; Use of Drugs in Treatment of Anemia, J. A. M. A. **107**: 1633 (Nov. 14) 1936.

8. Smith, E. L., and Parker, L. F. J.: Purification of Antipernicious Anaemia Factor, Biochem. J. **43**: viii, 1948.

9. Rickes, E. L., and others: Crystalline Vitamin B_{12}, Science **107**: 396 (April 16) 1948.

The question is often asked: Is it feasible to teach patients to give their own liver extract, and do any difficulties result from self-administration? For the past 13 years we have offered all patients requiring regular treatment with liver extract the opportunity of learning how to give their own treatment. A small proportion of these patients prefer to have their injections given by someone else. However, the majority accept the opportunity of learning to give their own injections, and in so far as we have been able to observe these patients have not had any difficulty because of self-administration. Occasionally, contrary to our suggestion, we have patients who prefer to take extracts by mouth. Here we prescribe either a solution of liver extract or one of the desiccated stomach or liver-stomach preparations for use in pernicious anemia.

Not infrequently the question arises as to whether present-day methods of treatment of pernicious anemia are superior to those first used at the time of the introduction of liver. From the standpoint of actual clinical improvement and without consideration of other factors, there is no reason to believe that the results produced by adequate amounts of raw or cooked whole liver were in any way inferior to those produced by the most approved liver extracts or vitamin B_{12} preparations. However, in other respects, liver extracts and vitamin B_{12} preparations have many desirable advantages.

Although there is no uniformity of opinion among well-informed hematologists concerning the exact amount of liver extract to be used in a given case, it is generally agreed, however, that, although no harm results from excessive amounts of liver extract, no real good results from it.

VITAMIN B_{12}

In the years 1930 to 1947 much effort was expended in trying to isolate from liver the principle responsible for the beneficial results in pernicious anemia. Then, in 1948, essentially simultaneously, Smith and Parker [8] in England and Rickes and co-workers [9] in this country isolated in crystalline form the cobalt-containing substance now known as vitamin B_{12}. This is now obtainable as a solution of the pure crystalline material or as concentrates containing vitamin B_{12} for parenteral use. The material is packaged on the basis of actual micrograms (0.001 mg.) in the solution of crystalline material or the equivalent in the concentrates, the latter values being established on the basis of microbiologic tests.

Vitamin B_{12} must be given parenterally in order to obtain the maximal benefit for the minimal cost. With parenteral administration the response of reticulated erythrocytes and the increase in number of erythrocytes and concentration of hemoglobin are of the same general order and occur within essentially the same time limits as their response to parenteral use of potent liver extracts. In brief, clinical results from the use of adequate amounts of vitamin B_{12} for pernicious anemia alone appear to be equal in every way to those obtained from a potent liver extract. There is, however, considerable variation in the amounts of crystalline B_{12} believed by various observers to be necessary for adequate treatment. Although in our hands 15 μg twice a month has constituted adequate treatment for the patient with pernicious anemia alone, other observers recommend as

V 1
195

much as 80 μg per month. Just as when liver extract is used, the patient with neurologic manifestations requires an increased amount. Although our experience with treatment of patients with neurologic manifestations of pernicious anemia does not permit us as yet to state unequivocally that vitamin B_{12} will do everything potent liver extract will do, all the evidence at hand so far tends to substantiate such a viewpoint.

The use of crystalline B_{12} does have certain advantages over use of liver extracts: (1) it can be used in instances of sensitivity to liver extract, and (2) it permits the use of specific quantities of purified crystalline preparations. Some manufacturers have placed on the label of their preparations of liver extract the approximate number of micrograms of vitamin B_{12} contained per unit. Recent observations in England through the use of microbiologic tests, however, have shown that in some instances the number of micrograms per cubic centimeter reported was far greater than could be determined on the basis of these tests. Thus the second advantage is still applicable.

There are in the literature reports on the use of various analogues of B_{12} in which there is only a slight change in the molecule or the addition of a simple chemical group. The preparations are known as vitamins B_{12A}, B_{12B}, B_{12C}, and B_{12D}. The response of the patient to these is essentially the same as with vitamin B_{12}.

Vitamin B_{12} is reported effective in the treatment of fish-tapeworm anemia and the megaloblastic anemia of total gastrectomy. However, in one report of megaloblastic anemia in total gastrectomy there was only partial response to vitamin B_{12}, and it was only after the addition of folic acid that the hemoglobin and erythrocyte count returned to normal levels. In nutritional macrocytic anemia, sprue, megaloblastic anemia of intestinal disease, and megaloblastic anemia of infancy the results produced by vitamin B_{12} have been variable.

Although most reports on treatment of megaloblastic anemia of pregnancy and the puerperium show failure of response to vitamin B_{12}, Patel and Kocher [10] reported the successful treatment in Bombay of five patients with this type of anemia, by injection of 40 μg of vitamin B_{12}. This is in direct contrast to the report of Ungley and Thompson,[11] who obtained no results with 65 to 80 μg and then a response to 2.5 mg. daily of folic acid.

FOLIC ACID

Folic acid was first isolated in 1943 and synthesized in 1945. The property of being essential for the growth of Lactobacillus casei and Streptococcus faecalis R makes possible its reasonable quantitation through microbiologic assay. It is an essential factor for hemopoiesis in man, monkeys, and certain other species. Deficiency of folic acid produces megaloblastic erythropoiesis, and administration of folic acid results in a prompt conversion of such a blood picture back to one of normoblastic regeneration.

The commercial product is available as a 5 mg. tablet for oral use or in solution containing 15 mg. per cubic centimeter for parenteral administration. Since folic acid is readily absorbed from the gastrointestinal tract, parenteral administration ordinarily has no advantages.

For pernicious anemia the administration of folic acid while bringing about a satisfactory hematologic remission and conversion of the marrow from a megaloblastic to a normoblastic state is not considered to be adequate treatment, since eventually a certain number of these patients have hematologic relapse. Furthermore, in spite of what is apparently adequate administration of this substance, neurologic and gastrointestinal manifestations of the disease may progress or even develop when they have not been previously present. Therefore, while its administration for pernicious anemia is not contraindicated, its use is not warranted.

However, in the treatment of megaloblastic anemia of pregnancy and the puerperium, anemia associated with intestinal disease, such as strictures and fistulas, nutritional macrocytic anemia of the tropics, megaloblastic anemia of total gastrectomy, and sometimes of megaloblastic anemia of infancy, use of folic acid results in prompt and excellent recovery. In most of these conditions, except pernicious anemia, treatment may be discontinued after recovery of the patient from the anemia. Folic acid also is said to be of value in treatment of tropical sprue. Girdwood [12] questioned whether the tropical sprue of Spies is the same as that reported from the tropics by the English, and he stated that he preferred to think of Spies' cases as instances in which malnutrition plays a large role.

CITROVORUM FACTOR OR FOLINIC ACID

In 1948 Sauberlich and Baumann,[13] while working with cultures of Leuconostoc citrovorum, found that for satisfactory growth a factor had to be added to the medium that was not present in the usual vitamin B complex. They found a good source of this growth factor in refined liver extracts used for treating pernicious anemia. This was termed "citrovorum factor." Bardos and others [14] found a substance effective in neutralizing the inhibiting action of methyl folic acid. They called this folinic acid and found it would act as growth factor for Leuconostoc citrovorum. In the citrovorum factor and folinic acid we are probably dealing with the same substance. This substance has been found capable of converting the megaloblastic marrow of pernicious anemia to a normoblastic one with adequate improvement in concentration of hemoglobin and number of erythrocytes. Experience with this substance is insufficient as yet for anyone to know whether it will merely react on a megaloblastic marrow and convert it to normal and then as in the case of folic acid fail to prevent gastrointestinal and neurologic manifestations and permit eventual relapse of hematologic symptoms. Our small experience confirms the good hematologic response reported recently by Davidson and Girdwood.[15]

10. Patel, J. C., and Kocher, B. R.: Vitamin B_{12} in Macrocytic Anaemia of Pregnancy and the Puerperium, Brit. M. J. **1**: 924 (April 22) 1950.

11. Ungley, C. C., and Thompson, R. B.: Vitamin B_{12} and Folic Acid in Megaloblastic Anaemias of Pregnancy and the Puerperium, Brit. M. J. **1**: 919 (April 22) 1950.

12. Girdwood, R. H.: Vitamin B_{12} and Related Factors; a Clinical and Experimental Review, Edinburgh M. J. **57**: 72 (Feb.) 1950.

13. Sauberlich, H. E., and Baumann, C. A.: A Factor Required for the Growth of Leuconostoc Citrovorum, J. Biol. Chem. **176**: 165 (Oct.) 1948.

14. Bardos, T. J.; Bond, T. J.; Humphreys, J., and Shive, W.: Relationship of the Folinic Acid Group and the Leuconostoc Citrovorum Factors, letter to the editor, J. Am. Chem. Soc. **71**: 3852 (Nov.) 1949.

15. Davidson, L. S. P., and Girdwood, R. H.: Treatment of Pernicious Anaemia with Leuconostoc Citrovorum Factor, Lancet **1**: 722 (March 31) 1951.

SUMMARY AND COMMENT

Except possibly in some very unusual situation the treatment of anemia resolves itself into the use of specific substances depending on the morphologic blood picture. In hypochromic anemias, which are usually due to loss of blood, the proper treatment is the oral use of a preparation of iron. For these anemias, liver extract, vitamin B_{12}, folic acid, desiccated hog stomach, and stomach-liver or iron-stomach-liver preparations serve no useful purpose and are definitely not indicated. In those unusual instances in which iron taken by mouth cannot be tolerated or produces an increase in gastrointestinal symptoms, it can be given intravenously.

The commonest diagnosis of macrocytic anemias with megoblastic type of bone marrow in northern United States is pernicious anemia. The most desirable form of treatment of this type of anemia is the parenteral use of a potent liver extract or the parenteral use of vitamin B_{12}. Preparations of liver or stomach or liver-stomach combinations for oral administration can be used and are effective when given in adequate amounts. The presence of neurologic manifestations with pernicious anemia requires that much larger quantities of potent material be used either parenterally or orally. Iron is not indicated unless loss of blood is associated with pernicious anemia. Folic acid, while not contraindicated, is not necessary in the complete treatment of pernicious anemia and, when used alone, constitutes inadequate treatment.

Concerning other diseases associated with megaloblastic anemia, there are differences of opinion regarding the response to vitamin B_{12} and folic acid. Some patients will respond only partially or not at all to vitamin B_{12}, and subsequently a good result can be obtained with folic acid. Many of the anemias in this group have to be treated on a trial and error basis, since with our present knowledge we have no way of knowing which material is going to be effective.

None of the substances discussed in this paper are of value in the treatment of the anemia associated with (1) various types of malignant lesions, particularly those with metastasis to the bone marrow, (2) diseases of the reticuloendothelial system, such as the various leukemias and aplastic anemia, and (3) diseases in which there is toxemia or interference with metabolism of hemoglobin, such as is seen in chronic glomerulonephritis with azotemia or in infections. In rheumatoid arthritis oral administration of iron is of no benefit, and the experience with iron given intravenously is as yet too limited to permit a satisfactory opinion.

Treatment with iron, liver extract, vitamin B_{12}, or folic acid is of benefit only when these substances are deficient, and none of these forms of medication is helpful in anemia due to some cause other than that produced by these specific deficiencies. A useful maxim then is: Determine the type of anemia present, give only the medicament indicated; do not mix the treatment.

MANAGEMENT OF BREECH PRESENTATION IN PREGNANCY AND LABOR

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Evidence that the management of breech presentation in pregnancy and labor is a controversial issue continues to appear.[1] Much has been written on the subject stressing the higher natal and neonatal mortality and the greater incidence of morbidity and injury to both the mother and baby attending this manner of birth. The prophylactic value of external cephalic version late in pregnancy is generally recognized, and there is manifest a definite trend of opinion favoring a partly spontaneous rather than a completely artificial termination of the second stage of labor.

Statistics show that a low fetal mortality is attainable provided the attendant observes certain fundamental and recognized principles peculiar to breech delivery, allows ample time for maximum dilatation of the cervix, and does not attempt delivery from below if borderline or positive cephalopelvic disproportion exists.

It is the purpose of this paper (1) to show the reduction in the incidence of breech presentation in labor that can be accomplished by external version late in pregnancy; (2) to show the reduction in fetal mortality and morbidity that is obtainable by conservative management, i. e., limiting total extraction to only those cases in which spontaneous bulging or crowning fails to occur; and (3) to emphasize the essential manipulations employed to minimize fetal mortality and morbidity. Emphasis is to be placed on the element of fetal risk concerned with the timing and technique of breech delivery itself.

MATERIAL

The analysis is based on a review of all breech deliveries occurring in 7,433 consecutive private cases, each delivery having been attended by some member of our group.

Statistics of fetal mortality show great variance among writers on this subject, owing mainly to the lack of a standard to follow in the elimination of factors that influence fetal risks. For example, Moore and Steptoe [2] and Patton and Mussey [3] include fetal weight of 1,500 gm. or more, Gordon [4] uses fetal weight of 2,500 gm. or more, and Hansen [5] includes all weights, in present-

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1. Ward, S. V., and Sellers, T. B.: Controversial Issues in Breech Presentation, South. M. J. **43**: 879-886, 1950.
2. Moore, W. T., and Steptoe, P. P., Jr.: The Experience of the Johns Hopkins Hospital with Breech Presentation: An Analysis of 1,444 Cases, South. M. J. **26**: 295-303, 1943.
3. Patton, G. D., and Mussey, R. D.: Breech Presentation: A Study of 302 Cases, Proc. Staff Meet., Mayo Clin. **15**: 389-393, 1940.
4. Gordon, C. A.; Garlick, R., and Ogniz, P.: An Analysis of 3,301 Breech Deliveries in the Hospitals of Brooklyn, New York, Am. J. Obst. & Gynec. **28**: 140-150, 1934.
5. Hansen, E. M.: Breech Delivery, Am. J. Obst. & Gynec. **41**: 575-582, 1941.

ing mortality results. Guyer,[6] Goethals,[7] and Greig [8] exclude cases of prolapse of the cord, whereas Seeley [9] and Potter [10] feel that this complication cannot be eliminated in arriving at a corrected fetal loss. In order to fairly attribute natal and neonatal mortality and morbidity to only those factors peculiar to breech delivery, it is believed proper to exclude those cases in which other conditions affecting the mother or baby might contribute to an unfavorable outcome.

We have therefore excluded all babies weighing less than 6 lb. (2,722 gm.). Babies weighing less than this seldom present serious difficulties in delivery, but, owing to the small presenting part, prolapse of the cord is a more frequent complication and neonatal death is due more to prematurity than to the effects of breech delivery.

In addition to limitation of underweight, it was considered justifiable to exclude other fetal handicaps, such as hydramnios, erythroblastosis, and gross malformations. Prolapse of the cord, if present on admission to the hospital or before the cervix was dilated sufficiently to permit delivery, was also excluded. Likewise, exception was made if the fetal heart beat was unobtainable on admission.

Maternal complications detrimental to the baby, such as placenta previa, abruptio, pre-eclampsia and eclampsia, chronic nephritis, syphilis, diabetes, and severe cardiac disease, justified exclusion of the case. Multiple pregnancy was excluded, since inertia, hydramnios, and interference with manipulations and the normal mechanism of labor are uncontrollable factors.

There were 193 breech deliveries among 7,433 consecutive cases reviewed, an incidence of 2.6%. With the omission of 46 cases in which the fetal weight was less than 6 lb. (2,722 gm.) and three cases in which macerated babies were delivered, there remained 144 cases, an incidence of 1.9% of term breech deliveries, for analysis.

MANAGEMENT OF BREECH PRESENTATION IN PREGNANCY

It is generally agreed that conversion of breech to cephalic presentation late in pregnancy is a worth-while procedure in reducing the incidence of breech presentation in labor and thereby lowering fetal mortality and morbidity. For many years one of us (R. A. B.) has practiced and taught the value of this procedure.[11] Ryder [12] in 1942 reported 92.5% success in performing external version and showed an incidence of 2% breech delivery in 1,700 consecutive viable cases. Eastman [13] states, "The procedure, if properly and gently performed, carries little danger, although not as much is accomplished by it as might be supposed." From a thorough review of the literature in 1949, Seeley [9] stated that 17 of 21 authors recommend this procedure as a valuable aid in reducing the incidence of breech delivery. Hanley [14] stated that the procedure is dangerous because of the uncertainty of the location of the placenta, and Trites [15] said, "The hazards of breech delivery are not sufficiently great to justify too vigorous or persistent attempts at external version."

Breech presentation was observed 2,251 times in 1,438 consecutive patients during routine abdominal examination from the sixth month of pregnancy to delivery. There were 624 nulliparas, among whom breech presentation was observed 1,048 times, and 814 multiparas, among whom there were 1,203 instances of this presentation. Considering the infrequency of prenatal visits and probability of frequent spontaneous changes in presentation, this figure grossly understates the actual occurrence of breech presentation in the last trimester of pregnancy.

External version was attempted 1,161 times and was successfully performed in 64.4%. At subsequent examinations the presentation was noted to have reverted to breech in 19.1%. In 118 instances external version failed with one attempt; in 86 instances with two attempts, and in 209 instances with three or more attempts.

As might be expected there was a higher incidence of successful external version in multiparas (77.9%) than in nulliparas (50.7%); likewise there was a higher incidence of reversion to breech in multiparas (20.7%) than in nulliparas (16.6%).

Figure 1 shows the percentage of success and failure attending the operation of external version, from breech to cephalic, at successive stages of pregnancy from the sixth calendar month to and shortly beyond the ninth month of pregnancy. It also shows the per cent of observed reversions, cephalic to breech at the same specified periods. During the seventh month, 84.7% of the attempted external versions were successful. The unexpectedly low incidence (2.1%) of spontaneous reversion is obviously explained by the infrequent observations at this stage. Many unobserved spontaneous versions and reversions must have taken place during this period.

There follows a progressive decrease in successful external versions until term or shortly beyond, when there is an unexpected increase, probably owing to more intensive effort at this late stage. The percentage of spontaneous reversion lessens as term is reached.

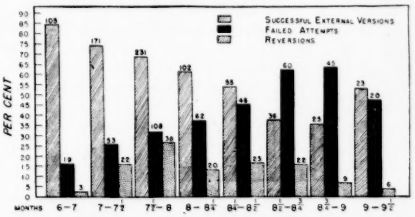

Fig. 1.—Chart showing 748 successful external versions, 413 failed attempts, and 143 reversions at successive stages of pregnancy.

Since many breech presentations correct themselves spontaneously, it is of interest to analyze the total number of breech presentations in this category. Spontaneous version occurred 778 times among 2,251 observed breech presentations. Sixty-eight of these followed a failed external version. The total number of spontane-

6. Guyer, H. B., and Heaton, C. E.: The Fetal Risk in Breech Delivery: A Study Based on 708 Cases, Am. J. Obst. & Gynec. **52**: 362-371, 1946.

7. Goethals, T. R.: Management of Breech Delivery in Primiparas, Am. J. Obst. & Gynec. **37**: 663-674, 1939; Management of Breech Delivery in Multiparas, ibid. **38**: 105-111, 1939.

8. Greig, D. S.: The Uncomplicated Primigravid Breech: Technique Used in Series of 60 Cases, J. Obst. & Gynaec. Brit. Emp. **52**: 122-129, 1945.

9. Seeley, W. F.: Fetal Mortality in Breech Deliveries, Am. J. Obst. & Gynec. **57**: 113-124, 1949.

10. Potter, M. G.; Erving, H. W., and Brown, J. B.: Observations on Breech Deliveries in General Hospital, Am. J. Obst. & Gynec. **49**: 567-575, 1945.

11. Bartholomew, R. A.: Prophylactic External Version, Am. J. Obst. & Gynec. **5**: 648-660, 1927.

12. Ryder, G. H.: Breech Presentations Treated by Cephalic Versions in the Consecutive Deliveries of 1,700 Women, Am. J. Obst. & Gynec. **45**: 1004-1025, 1943.

13. Eastman, N. J.: Williams Obstetrics, ed. 10, New York, Appleton-Century-Crofts, Inc., 1950.

14. Hanley, B. J., and Rosenblum, G.: Breech Delivery: Review of 218 Cases, West. J. Surg. **45**: 98-104, 1937.

15. Trites, A. E.: A Study of Breech Delivery, Am. J. Obst. & Gynec. **55**: 430-436, 1948.

ous versions would, no doubt, have been greater had not routine external version been practiced. It is evident that spontaneous version (breech to cephalic) occurs most frequently from the sixth to the end of the eight month, after which it occurs less frequently and declines less rapidly.

As shown in figure 2 the total number of reversions from cephalic to breech following spontaneous version increases from the sixth to the end of the eighth month but diminishes near term. The highest incidence of reversion, whether after external version or after spontaneous version, was in the period from seven and one-half to eight months. Spontaneous version may occur occasionally at or beyond term, when the attendant has desisted from further efforts to perform external version.

Reversion to breech presentation after external version occurs with greater frequency than after spontaneous version. This has been mentioned by many writers. In 748 successful external versions in our series, reversion occurred in 19.1%, whereas, in 778 spontaneous versions, reversion occurred in only 9.6%.

Some doubt has been expressed as to the actual benefit of external version in reducing the incidence of

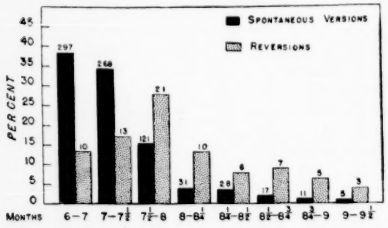

Fig. 2.—Chart showing 778 spontaneous versions and 75 reversions at successive stages of pregnancy.

breech delivery, which is generally considered to be 3% to 4% of babies born from seven months to term. In our series, with routine external version, there was an incidence of 2.6% breech deliveries, on the above basis, but, if one considers only full term babies weighing 6 lb. (2,722 gm.) or more, which, by reason of their size, encounter greater hazards if delivered as breech, the incidence is reduced to 1.9%. If one accepts as a conservative estimate an over-all fetal mortality of 10% for breech delivery, the fetal salvage is worth while, but, for those whose management of breech delivery is attended by a very low mortality, the fetal salvage effected by routine external version would seem to be negligible. However, since there was no recognizable harm to the mother or baby in 1,161 attempted external versions, successful and unsuccessful, there can be no objection raised to employment of this procedure. There was very little discomfort to the patient during or after the performance of external version, and in many instances a feeling of greater comfort was expressed by the patient following this procedure.

As to the optimum stage of pregnancy for first employment of external version, we have long felt that breech presentation in the nullipara should be ignored until pregnancy has reached seven and one-half calendar months, and in the multipara, eight months. The impression was held that prior to these stages recurrence of breech presentation was too frequent, but further postponement involved greater difficulty in turning the baby. This impression is apparently borne out in both external and spontaneous version at seven and one-half to eight months (fig. 1 and 2). On the contrary, Ryder advocates external version at any time a breech presentation is found.

TECHNIQUE OF EXTERNAL VERSION

The first essential point in the technique of performing external version should be gentleness in palpation. The patient should be relaxed and the bladder empty, and there must be an accurate preliminary diagnosis of presentation and position. The breech is first raised from the pelvis with both hands and carried toward the lower quadrant opposite to that toward which the head is to be brought down. If the breech is engaged at one visit, it is important to re-examine the patient in one week, when the breech may be found disengaged and movable. The attitude of flexion is maintained by pushing down with one hand on the fetal head while the breech is pushed toward the fundus with the other, using the flat of the fingers and exerting gradual and intermittent pressure. One is probably less likely to disturb the placental site if more effort is exerted in pushing the breech up than pushing the head down. It is important to rest the patient at intervals, take ample time, but continue support to the breech to avoid losing any of the gain made. During this short rest the baby may kick against the hand supporting the breech and thereby accomplish the turn.

It is not necessary to stop the maneuver to listen to the fetal heart from time to time, since slowing of the heart rate is apparently due to pressure on the head and not on the cord, as was first affirmed by Kautsky (in Eastman [13]).

If external version proves too difficult, it is far better to desist and try again after an interval of one week than to use too much force. Owing to the temptation to use too much force, anesthesia is not justifiable, except perhaps in borderline cephalopelvic disproportion, in which a test of labor is desirable, or in a case of transverse presentation on admission of the patient in labor. Usually the operation is successful if it is possible to move the fetus from breech to a transverse position.

After successful external version it is best to rest the patient a few minutes, then try to settle the fetal head into the pelvic inlet and fix it manually by the use of fundal or suprapubic pressure. It is advisable to see the patient one week after successful version, in order to determine whether reversion has occurred. If the version is unsuccessful near term and a breech delivery is necessary, the patient should be advised to enter the hospital early in labor, to afford better opportunity to preserve the membranes and, in the event of early spontaneous rupture, to permit quick determination of the possibility of cord prolapse. On account of the increased fetal mortality with large babies, one should allow not over 10 days to two weeks overtime, provided the patient presents findings favorable for induction, such as descent of the breech and an effaced dilating cervix.

Induction of labor prior to this is contraindicated, for the convenience of the patient or the doctor, because of the well-known hazards of inertia and poor dilatation of the cervix that might follow.

MANAGEMENT DURING LABOR

When labor reaches the stage at which the breech is at or below the spines, the cervix may seem to be fully dilated, but actually it may not be dilated sufficiently to pass the head. This false interpretation is particularly true of footling and complete breech but less so of frank breech, in which variety the presenting part is larger and effects more dilatation, being made up of the thighs and lower part of the trunk.

It is at this point that the attendant may be tempted to undertake extraction or may choose to follow a routine practice of breaking up a full or frank breech that has progressed to bulging but not crowning. It is this practice that is generally believed to be unwise and should not be employed unless the patient fails to advance the breech to crowning of the anterior hip and appearance of the anus over the perineum after a further period of good labor. The object of this further test is to assure the maximum possible degree of dilatation of the cervix by the time spontaneous crowning occurs or when the patient has failed to make additional progress for one to one and one-half hours of good labor.

It appears that an analogy has been assumed between the common practice of prophylactic low forceps delivery in cephalic presentation and the feasability of an early breaking up and extraction of complete or frank breech presentation. The analogy, however, does not hold true.

In cephalic presentation, the cervix is pushed down with the head and a state of full dilatation can be readily determined. The largest part of the baby is coming first, and a safe delivery is almost assured if the attendant is reasonably experienced in the use of forceps. In breech presentation, however, even though the attendant may be skilled in the performance of extraction, there may still be present some degree of cervical resistance which may delay delivery of the head and cause asphyxia of the baby.

If the head is held by the cervix, it is extremely difficult, if not impossible, to cut the cervix, as can be done in cephalic presentation, since the bulk of the fetal body in the vagina interferes. The same holds true should the arms become extended. It has been stated that the attendant may determine, by vaginal examination preceding extraction, that the cervix is not completely dilated, and, if not, he may manually complete the dilatation. This, also, would seem to be impossible for the reason stated above, plus the fact that very few cervices can be successfully dilated manually, even if the vagina is empty.

Furthermore, in frank breech presentation it is necessary to elevate the breech to successfully perform a Pinard maneuver. When the foot has dropped into the operator's hand, considerable elevation of the breech is also required to permit the thigh to pass through the arc necessary to pull the leg down. If ample elevation of the entire breech is obtained, there is danger of possible prolapse of the cord; if elevation is insufficient, there may be overstretching of the lower uterine segment and danger of uterine rupture. Also the movements of elevating and then lowering the breech may extend the arms or predispose to nuchal hitch, which may delay delivery.

REQUIRED VERSUS ELECTIVE BREECH EXTRACTION

Complete breech extraction, as defined by Eastman,[13] should therefore be qualified as to whether the operation is required or elective.

In the elective type the attendant assumes that the cervix is fully dilated and attempts to deliver by complete extraction. The patient may not have accomplished all the dilatation and descent of which she is capable, and with further test she might have been able to reach the stage of bulging and crowning. Full dilatation for the breech does not necessarily mean full dilatation for the aftercoming head. Further waiting would not have necessitated more than partial breech extraction to effect delivery.

In the required type of total breech extraction, the patient has made all the progress of which she is capable and there has been no advance for one to one and one-half hours. Failure to progress after an adequate test, therefore, constitutes an indication for a required total extraction. Assumption that the cervix is fully dilated is less likely to be in error in this case, since an ample test has been permitted.

The relative merits of assisted and complete breech extraction as to fetal mortality and injuries are strikingly shown in the summaries given by Gordon,[4] Goethals,[7] and Moore,[2] who have analyzed large series of cases according to the method of delivery. "Partial breech extraction" is the term proposed by Eastman, Greenhill, and McCormick (in Eastman [13]) to take the place of the term "assisted breech delivery." "Total breech extraction" is proposed to take the place of the term "extraction," and it is in this variety there arises the need of differentiating between "elective" and "required total breech extraction."

Gordon, excluding the same fetal and maternal extraneous factors as mentioned in our series, but choosing a fetal weight above 5½ lb. (2,495 gm.) rather than 6 lb. (2,722 gm.), showed the following results in 2,601 breech deliveries: in spontaneous or assisted breech delivery, the fetal mortality was 6.7% with an incidence of 2% fetal injury; in breeches extracted, the fetal mortality was 18.7% with 5% fetal injury; when the breech was "broken up" and extracted, the fetal mortality was 28.9% with 9.9% fetal injury.

Goethals, with the same fetal and maternal criteria as in our series and a fetal weight of 6 lb., obtained the following results in 500 pelvic deliveries of term breech presentations in nulliparas: Comparing the fetal mortality in this group during the first 33 years, when the policy at the Boston Lying-in Hospital was strict conservatism, with the last seven years, when the policy was changed to include "extraction with full dilatation," he showed a reduction in fetal mortality from 11% to 7.4%. However, in both periods alike, when the fetal loss was grouped into four types of delivery, "extraction with dilatation" showed the highest mortality.

Moore and Steptoe, using the same criteria but specifying a fetal weight of 5½ lb., studied the results in 1,444 breech deliveries, covering a 46-year period at the Johns Hopkins Hospital. A total mortality of 12.8% was found. The fetal loss was three times greater in the group of "decomposition and extraction" than in that of "spontaneous to the umbilicus, then assist," during a period covering the first 36 years of this analysis. The highest fetal mortality of the last 10 years occurred among multiparas who were delivered by the method of "decomposition and extraction." The results obtained by those of lesser skill and experience who attempt to emulate these practices must inevitably be much more unfavorable.

TABLE 1.—*Management of Term Breech Delivery in 144 Cases with Fetal Weight of 2,722 Gm. or More*

Type of Delivery	Number	%
Cesarean section	14	9.72
Breech delivery	130	90.28
Spontaneous	0	0
Partial extraction	101	77.69
Total extraction	29	22.31
Required	16	55.17
Elective	13	44.83

Many of these patients were delivered by residents in training; hence the results would not be expected to equal those of long-experienced specialists. For example, Hansen,[5] reporting 126 breech deliveries in 12 years of private practice, shows a corrected fetal mortality of 0.8%; Gustafson [16] reported the loss of one baby in a series of 109 cases, and Greig [8] showed one stillbirth occurring among 60 breech deliveries in nulliparas.

Skill and experience may compensate to some extent for ill-timed total elective extraction, but even in the best of hands there is a higher incidence of fetal mortality and morbidity than in cases of partial extraction.

In 16 of the 144 cases of term breech delivery, total extraction was required because of lack of progress in the second stage of labor, with the breech failing to advance to more than bulging or slight crowning for one to one and one-half hours. That the remaining 13 patients were delivered by elective total extraction, not in accord with the policy of expectancy which we advocate, was due in part to one of the group formerly favoring earlier interference.

TABLE 2.—*Fetal Mortality*

Type of Delivery	Total Cases	Mortality: Uncorrected No.	Uncorrected %	Corrected* No.	Corrected* %
Spontaneous	0	..	....	..	....
Partial extraction	101	3	2.97	1	0.69
Total extraction	29	4	13.79	0	0
Cesarean section	14	0	....	..	....
Total	144	7	4.86	1	0.69

* Total corrected fetal mortality, excluding cesarean sections, 0.77%.

Table 2 shows the results obtained by favoring a policy of restricting total breech extraction to complete extraction of the "required" type.

A total of seven babies was lost, giving a gross mortality of 4.86%, which, after correction, is reduced to 0.69%. Excluding the cesarean sections, which carried no fetal mortality, the gross fetal mortality was 5.39%, corrected to 0.77%.

Cesarean section was performed in 14 cases. In five of these it was deemed advisable on account of a previous section. The indications in the remaining nine cases are recorded in Table 4. Two-thirds of these patients were over 30. One-third were nulliparas over 30.

Other data of interest in the 130 patients delivered through the pelvis may be mentioned as follows: Thirteen were in the age group 35-45 years, 82 were nulliparas, and 48 multiparas. The membranes ruptured spontaneously during labor in 59, prematurely in 44, and artificially in 27 cases. Labor began spontaneously in 116 and by induction in 14 cases. The breech was of the frank variety in 103 and incomplete in 27 cases. Episiotomy was performed in 122 cases; forceps were applied to the aftercoming head in 95 cases; a Pinard maneuver was done in 24 of the 29 total extractions. Seventeen patients had had previous breech deliveries. There were three cases (2.3% incidence) of prolapse of the cord, one of which accounted for a fetal death.

TABLE 3.—*Causes of Fetal Mortality in 130 Breech Deliveries*

Type Delivery	Stillbirth	Neonatal Deaths	Total: Uncorrected	Total: Corrected
Partial extraction	0	Erythroblastosis §	3	1
		Spina bifida; hydrocephalus ‖		
		Atelectasis ¶		
Total extraction (required)	Asphyxia-abruptio placenta *	0	2	0
	Asphyxia; contraction ring; cervix 4-5 cm.†			
Total extraction (elective)	Asphyxia-prolapsed cord; hydramnios; cervix 3 cm.‡	Pneumococcic meningitis; premature rupture of membrane ⁋	2	0
			7	1

* Asphyxia: frank breech; total (required) extraction; weight 8 lb., 2 oz. (3,685 gm.); nullipara; failed version; spontaneous version at 8¾ months; reverted; onset of labor at 9½ months; premature separation of placenta.

† Asphyxia-contraction ring: frank breech; total (required) extraction; weight 6 lb., 6½ oz. (2,906 gm.); multipara; cessation of fetal heart when cervix was 4 cm. dilated; Bandl's contraction ring encircling fetus on undertaking delivery-craniotomy.

‡ Asphyxia-prolapsed cord: frank breech; total (elective) extraction; weight 7 lb., 14½ oz. (3,586 gm.); multipara; marked hydramnios; spontaneous rupture of membranes with rupture of marginal sinus of the placenta and hemorrhage; prolapse of cord through 3 cm. dilated cervix and rapid disappearance of fetal heart tones following insertion of bag.

§ Erythroblastosis: frank breech; partial extraction; weight 7 lb., 13 oz. (3,344 gm.); nullipara; transfusion 15 years previously; no difficulty with delivery; replacement transfusions; died on third day.

‖ Spina bifida, moderate hydrocephalus: frank breech; partial extraction; weight 8 lb., 1 oz. (3,657 gm.); nullipara; failed external version; died on sixth day.

¶ Atelectasis, clinically: frank breech; partial extraction; weight 6 lb., 6¾ oz. (2,892 gm.); multipara; premature rupture of membranes; precipitous labor; difficult to resuscitate; lived 4 days; lumbar puncture negative for blood; no autopsy.

⁋ Pneumococcic meningitis: frank breech; total (elective) extraction; weight 6 lb., 6½ oz. (2,906 gm.); multipara; premature spontaneous rupture of membranes 12 hours before onset of labor; uneventful delivery; lived 38 hours; autopsy.

TABLE 4.—*Cesarean Section in 144 Term Breech Deliveries*

	No.	Maternal Mortality	Fetal Mortality
Repeat	5	0	0
Primary	9	0	0

INDICATIONS FOR PRIMARY CESAREAN SECTION

1. Premature rupture of membranes; failure of dilation and descent.
2. Mid and outlet contraction of pelvis; inertia.
3. Nullipara; age 42; fibroid uterus; contracted outlet.
4. Insistence on live uninjured baby; liability of foreliying cord (proved).
5. Suspected acute abdomen at term; risk of induction.
6. Nullipara; age 37; overdue; large baby; inertia after induction.
7. Age 39; previous difficult forceps; outlet contraction; insure healthy baby.
8. Age 39; para 2; no living children; insistence on healthy baby.
9. Funnel pelvis.

16. Gustafson, G. W.: Management of Breech Presentation, J. Indiana M. A. 42: 783-787, 1949.

Fetal injury occurred in four cases, or 3%, as follows: intracranial hemorrhage with convulsions and recovery; depression of the parietal bones bilaterally, as a result of slipping of Piper's forceps; fracture of the clavicle with the delivery of a nuchal arm; and one brachial plexus injury. The last two fetal injuries mentioned occurred when the total extraction was elective.

ESSENTIALS IN MANAGEMENT OF TOTAL BREECH EXTRACTION

Complete anesthesia is necessary in order that the attendant may be unhindered in his manipulations and maximum relaxation obtained. The anesthesia should be complete when extraction is undertaken. It is essential that the patient's legs be in stirrups or her hips to the edge of the bed and the legs supported. The bladder should be emptied.

Preparations should be made in advance for resuscitation of the baby—oxygen, tracheal catheter, bulb for aspiration of mucus, and hot blankets. Forceps should be in readiness for delivery of the aftercoming head, along with a retractor to depress the perineum to permit access of air, should the baby attempt to breathe before complete delivery.

After thorough ironing out of the lower vagina and perineum, with liberal use of medicinal soft soap solution, a deep mediolateral episiotomy should be done in all nulliparas just preceding extraction, to facilitate delivery and prevent tears through the rectal sphincter or anterior rectal wall. The same precaution applies to multiparas, but to a lesser degree.

To perform a Pinard maneuver, there should be ample elevation of the breech; the foot corresponding to the anterior leg should be grasped to favor keeping the back to the front, the other leg being released by flexion, when visible, pressing behind the knee. Towels aid one to maintain a secure hold on the advancing parts, and, when the umbilicus appears, a loop of cord should be pulled down to prevent stretching, since at this stage the cord may be compressed against the inlet.

The back is kept obliquely toward the front; the scapulas are brought well into view; the baby is depressed and the posterior shoulder rotated anteriorly toward the symphysis, by which maneuver the shoulder and arm come into view and are usually freed with ease. By reverse rotation, the other shoulder, which is now posterior, is brought anteriorly and released along with the arm, in the same manner, as described by Potter.

The head, which now comes into the pelvis (obliquely if the latter is normal, more in the transverse if contracted anteroposteriorly, or in the anteroposterior if the pelvis is narrow or of the male type) is guided and pressed down by the hand over the symphysis. Forceps should always be used to deliver the head if the patient is nulliparous, to prevent overstretching of the articulations of the cervical vertebrae, or of the brachial plexus if the attendant attempts delivery by downward pressure of the fingers placed on the shoulders. If the patient is multiparous, the same applies if manual efforts meet with undue resistance.

The delivery of the aftercoming head can be entrusted to the ordinary forceps, which in our experience have proved adequate. The head should first be brought into the pelvis by manual manipulation from above and below, and the forceps are easily applied to the sides of the head in the mento-occipital diameter, when the chin is in view posteriorly. If the head is caught at the inlet, a specially designed forceps may reach to a higher level in the pelvis, but an application is difficult to secure. Owing to the greater spring in the long shanks of the Piper forceps, they may slip and groove the sides of the head, as happened in one case in our series. Once the chin and mouth are over the perineum and the baby has access to air, the head should be delivered very slowly, to lessen the risk of laceration of the rectal sphincter or anterior rectal wall.

In complete or frank breech, if impaction prevents delivery the breech must be elevated sufficiently to permit the feet and legs to be drawn down. In footling presentation, with one or both feet crowning and advancing rapidly, the feet may be wrapped in a sterile towel and held back until the patient is under anesthesia, prepared and ready for delivery. It is in these cases that the cervix may be even more inadequately dilated, because of the smaller bulk of the presenting part and seriously delayed delivery of the head.

Should there be difficulty in delivering an arm because of a nuchal hitch, one may try rotating the corresponding shoulder toward the hitch (hoping the arm will be displaced by friction) from behind the occiput toward the baby's face. If this fails, the breech is pushed up to elevate and loosen the arm, after which it may be reached and splinted down across the chest. In all maneuvers it is important to avoid excessive haste.

Finally, the baby should be thoroughly examined for injuries or evidence of spasticity, the perineum and vagina for extension of the episiotomy, the cervix for lacerations, and the lower uterine segment for possible tears.

CONCLUSIONS

1. By prophylactic external cephalic version, it was found possible to lower the incidence of breech delivery in the period of viability from the generally accepted frequency of 3.3% to 2.6% and for term breech delivery to 1.9% in 7,433 consecutive cases taken from private practice.

2. Total breech extraction should be qualified according to whether it is elective, on the assumption that the cervix is fully dilated and delivery feasible, or required, after an adequate test of labor gives more assurance that the cervix has attained maximum dilatation but the patient has ceased to make progress.

3. By limiting total breech extraction to only those cases in which bulging and crowning fail to occur spontaneously after an adequate period of good labor and by excluding those cases in which certain maternal and fetal complications involve risks to the baby, unrelated to breech delivery, it is possible to attain a fetal mortality rate comparable to that of cephalic presentation.

4. The uncorrected fetal mortality, natal and neonatal, was 4.8% and the corrected mortality 0.6%, cesarean sections included. The maternal mortality was nil.

5. The incidence of cesarean section was 9.7%; excluding the repeat sections, the incidence was 6.2%.

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FACTORS IN THE ONSET OF CORONARY OCCLUSION AND CORONARY INSUFFICIENCY

EFFORT, OCCUPATION, TRAUMA, AND EMOTION

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and
Harry L. Jaffe, M.D., New York

Diseases of the heart, particularly those involving the coronary arteries, are the major medical problem facing us today. Estimates of the number of persons with heart disease in this country have varied up to eight million,[1] and practically half of cardiac deaths are caused by coronary artery disease.[2] We have estimated that one-half to one million attacks of coronary occlusion occur annually.[3] Probably an equal number of acute coronary insufficiency occur.[4] As the span of life has lengthened, the incidence of coronary artery disease has increased, and will continue to do so. It has been estimated that in 1980 there will be 42 million persons between the ages of 50 and 74—almost double the number in 1940.[5]

The importance of coronary artery disease in industry scarcely requires emphasis, considering that over 60 million persons are employed and that, although two-thirds of acute coronary attacks occur in persons over the age of 50, the disease is common in the fifth, and even in the fourth, decade.[6] Accordingly, the question of the relationship of acute coronary episodes to effort and trauma has assumed paramount importance.[7] It is now generally accepted that the vast majority of attacks of acute coronary occlusion take place fortuitously and spontaneously; the frequent occurrence during sleep is legendary. However, there is some disagreement in regard to the small group of cases in which an attack directly follows effort or trauma.[8] We believe that much of this difference of opinion results from a confusion in terminology and would be dispelled if it were clearly realized that there are two types of acute coronary disease, i. e., acute coronary occlusion and acute coronary insufficiency, which usually differ in onset as well as pathologically and electrocardiographically.[9] From the standpoint of therapy and compensability, it is essential to differentiate these two types of acute coronary episodes, even though they may simulate each other clinically. Not infrequently, coronary occlusion is said to have been caused by effort when actually study of the electrocardiogram discloses coronary insufficiency.[10] In our experience coronary occlusion and coronary insufficiency present typical electrocardiographic patterns which differentiate them in 95% of the cases.

ACUTE CORONARY OCCLUSION

Acute coronary occlusion is a more or less rapid obstruction of a medium-sized or large artery by a thrombus, which usually results in a large, confluent, through-and-through infarct unless the patient succumbs very early. The thrombus forms only in a previously sclerotic artery, either directly on an arteriosclerotic plaque or secondary to an intimal hemorrhage in such a plaque. In rare instances the hemorrhage forms a hematoma large enough to occlude the lumen without a thrombus.[11] Since the infarction extends from endocardium to pericardium, mural thrombi form, which may cause peripheral embolization, and a friction rub may be heard. Although the clinical picture is variable, severe pain is usually present and shock and heart failure are common. The electrocardiogram usually presents a characteristic, progressive pattern, consisting of RS-T elevation and deep Q waves followed by T-wave inversion as the RS-T segment returns to normal (Fig. 1). The electrocardiographic abnormalities are persistent and often permanent.

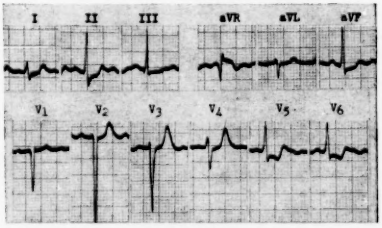

Fig. 1.—Electrocardiogram of a 38-year-old man with acute coronary insufficiency after effort, the standardized two-step exercise test. RS-T segments depressed in leads 1, 2, 3, and V_4, V_5, V_6.

ACUTE CORONARY INSUFFICIENCY

Acute coronary insufficiency includes several types of acute coronary episodes. The simplest is the classical brief attack of angina pectoris resulting from a temporary functional inadequacy of coronary circulation. It is usually precipitated by exertion, excitement, cold, or ingestion of food and is relieved promptly by glyceryl trinitrate and rest. These episodes usually last a few minutes, rarely more than half an hour. No matter how severe the pain, when the attack is ended the patient returns to his previous condition and is usually well.

We restrict the term acute coronary insufficiency to more severe attacks, in which pain is more prolonged or in which the process passes beyond the functional stage and results in necrosis or infarction of the myocardium. Consequently, shock, heart failure, a fall in blood pressure, fever, leukocytosis, and an increased sedimentation rate may appear, but they are usually less severe than in coronary occlusion. This is so because, unlike the massive, through-and-through infarct usually present in coronary occlusion, only focal disseminated areas of necrosis limited to the subendocardial region and papillary muscles ordinarily are produced by coronary insufficiency.

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Since the subpericardial layer is not involved, a pericardial rub is absent; also embolic phenomena do not occur, because the endocardium is spared. Because of the subendocardial localization of the ischemia or necrosis, in the electrocardiogram in coronary insufficiency there are RS-T depressions and T-wave inversions; RS-T elevation is absent, since the subpericardial layer is not involved, and there are no Q-waves because the infarct is not through and through (Fig. 2). The electrocardiographic alterations usually disappear within several days or weeks. One exception to these rules is coronary occlusion with true posterior infarction, which is not common. As it is ordinarily used, the term posterior infarction applies to infarction of the diaphragmatic surface. An infarct confined to the posterior surface produces an electrocardiographic pattern similar to that of coronary insufficiency. In addition, there is a large R-wave in lead V_1, but this is not diagnostic since it may be present normally.

Coronary insufficiency arises when there is a disproportion between the oxygen requirement of the myocardium and the supply immediately available.[6g] For purposes of pathogenesis, cases of coronary insufficiency may be divided into two groups. In the first, the attack

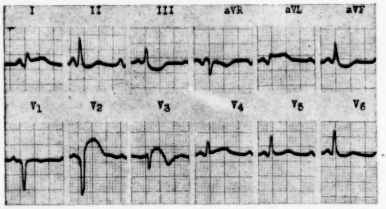

Fig. 2.—Electrocardiogram of a 53-year-old man three days after acute coronary occlusion. Q-wave in leads 1, aVL, V_1, V_2, V_3, with RS-T segment elevations in 1, aVL, and V_2, V_3, and V_4.

is precipitated by factors that increase the oxygen demands of the heart, decrease the coronary flow, or reduce the oxygen-carrying capacity of the blood. Thus, the attack may follow effort, excitement, trauma, sexual intercourse, straining at stool, extremes of heat or cold, tachycardia, shock, hemorrhage, heart failure, operation, anesthesia, hypoglycemia, various infections (including gastroenteritis), carbon monoxide poisoning, excessive smoking, chronic anemia, hyperthyroidism and hypothyroidism, hypertensive crises, Addison's disease, aortic stenosis, pulmonary embolism, and gallbladder and other abdominal diseases. In these cases, treatment of the etiological condition may be life-saving. For example, we have given up to 2,500 cc. of blood in acute hemorrhage, all within 24 or 36 hours.

In the second group of cases of coronary insufficiency, the episode is not related to any obvious event; it occurs spontaneously, as do practically all attacks of coronary occlusion.[7] In these cases it may be assumed that changes are taking place in one or more coronary arteries, changes such as progressive narrowing or subintimal hemorrhage, which do not progress to occlusion but are sufficient to produce pain, on effort or at rest, and even subendocardial necrosis. These cases of coronary insufficiency are differentiated from those of coronary occlusion by the electrocardiographic pattern and the relatively rapid return of the electrocardiogram to its previous state.

MATERIAL

We have been investigating the mode of onset in coronary attacks for many years and in previous papers have reported our findings in 1,700 attacks of coronary occlusion.[7] At present our studies cover 2,080 attacks and 100 episodes of coronary insufficiency. We obtained detailed histories of the activities of the patients during the eight weeks preceding the attack up to its actual onset. It is possible to determine a premonitory stage in almost half the cases of coronary occlusion.[12]

TABLE 1.—*Types of Activity at Onset of 1,347 Attacks of Coronary Occlusion*

Activity	No. of Attacks	%
Sleep	305	22.6
Rest	401	29.8
Ordinary mild activity	302	22.4
Moderate activity	117	8.7
Walking	198	14.6
Unusual or severe exertion	24	1.9
Total	1,347	100.0

In Table 1 it will be seen that, in 1,347 attacks, the occlusion occurred during sleep in 22.6% of the cases, at rest in 29.8%, during usual, mild activity in 22.4%, during moderate activity in 8.7%, while walking in 14.6% and during unusual or severe exertion in only 1.9%. Mild activity included such routine functions as dressing, conversing or taking a shower at home, getting out of bed, sitting in a theater, attending a meeting, doing light housework, riding in a train or bus, and waiting in a doctor's office. Moderate activity consisted of work at a trade, such as painting, pressing, baking, or driving a car, bowel movement or enema, coitus, shopping, and climbing stairs. Unusual activity included sports, lifting or moving a load, and running.

The relation of coronary occlusion to effort was investigated from another point of view, i. e., occupation.

TABLE 2.—*Occupations in 1,495 Cases of Coronary Occlusion*

Occupation	No. of Patients	%
Workers and laborers	501	33.5
Store workers	89	6.0
White collar and office workers	138	9.5
Businessmen	180	12.0
Professional class	135	9.0
Housewives	295	20.0
None or retired	157	10.0
Total	1,495	100.0

Table 2 shows that all classes were encountered, including skilled and unskilled laborers, store and office workers, businessmen, and professional persons. As was to be expected, workers and laborers formed the largest group, 33.5%. The incidence of the other groups varied from 6% to 12%. It is noteworthy that 10% of the patients were retired. Table 3 discloses a close correlation between the groups in our series and the employed population of New York and New Jersey. In our series the incidence of workers and laborers was 6% less than

in the working population, the incidence of store and office workers and businessmen was 2% greater, and the incidence of professional persons was 4% greater. These differences are not significant. The slightly lower incidence of workers and laborers may be partly explained by the fact that laborers form a relatively small

TABLE 3.—*Comparison of Occupations in Coronary Occlusion and General Population Groups*

Occupation	Percentage: Patients with Coronary Occlusions	Percentage: Labor Force, N. Y., Nov., 1946
Workers and laborers	48%	54%
Store, office, business	39%	37%
Professional workers	13%	9%
Total No. in All Occupations	1,043	3,280,824

proportion of the population of the hospital where our cases were studied. From our figures it may be concluded that occupation and social status do not affect the incidence of coronary occlusion. This opinion is shared by some authors,[13] but the general belief, among physicians as well as lay persons, is that coronary occlusion much more frequently affects those whose work or occupation involves considerable mental activity, competition, anxiety, and stress, e. g., executives, business leaders, professional persons, foremen, and skilled workers.[14] This is probably true of physicians, in whom coronary disease occurs more frequently than in the general population.[15] It is notable, however, that their age at death is not greater.[15]

Tables 4 and 5 make it evident that the incidence of coronary occlusion varies little during the cold and warm seasons and during the day (7 a. m. to 7 p. m.) and night (7 p. m. to 7 a. m.). The incidence was only about 3% greater during the colder months and during the day, a difference which is not significant. Mintz and Katz [81] also found no influence of season in coronary occlusion, but other authors believe that the disease is commoner in the cold weather.[16]

Among the 570 most recent acute coronary episodes collected by us, there were 370 attacks of coronary occlusion and 200 of coronary insufficiency, a ratio of almost 2:1. The actual incidence of acute coronary insufficiency is probably much higher, since, in several large series of sudden deaths of patients examined at necropsy, coronary insufficiency was found in 65% to 80% of the cases.[17]

TABLE 4.—*Seasonal Incidence in 1,151 Attacks of Coronary Occlusion*

Season	No. of Attacks	%
Winter	300	26.1
Spring	268	23.3
Summer	288	25.0
Autumn	295	25.6

Also, doubtless many cases of coronary insufficiency are too mild to cause the patient to consult a physician.

Table 6 shows the mode of onset in 100 attacks of coronary insufficiency. Fifty-six occurred at rest or during mild or moderate activity; the remaining 44 were associated with conditions decreasing the coronary flow, impairing the oxygen content of the blood, or increasing the work of the heart. The commonest factors were hemorrhage, pulmonary embolism, effort, tachycardia, operation, excitement, and meals. Others included trauma, heart failure, acute cholecystitis and pancreatitis, gastroenteritis, hypertensive crises, carbon monoxide poisoning, asthma, and smoking. In all these cases the electrocardiogram presented RS-T depression and/or T-wave changes.

Our personal experience with trauma to the heart, other than penetrating wounds, is not extensive, but a study of the literature makes it evident that nonpenetrating injuries of the chest and abdomen, whether direct or indirect, can produce functional derangement of the heart (commotio cordis) or contusion.[18] It is our belief that trauma rarely results in coronary occlusion, if at all; it occurs only if an artery is directly injured.[19] The vast majority of conditions reported as traumatic coronary occlusion have actually been contusions of the heart,[18] and the failure in the past to distinguish between these two conditions makes it imperative to re-evaluate the entire field of

TABLE 5.—*Period of Day of Onset of 944 Attacks of Coronary Occlusion*

Period of Day	No. of Attacks	%
7 A. M.–1 P. M.	267	
1 P. M.–7 P. M.	220	
7 A. M.–7 P. M.	487	51.6
7 P. M.–1 A. M.	218	
1 A. M.–7 A. M.	239	
7 P. M.–7 A. M.	457	48.4

TABLE 6.—*Activity at Onset of 100 Attacks of Coronary Insufficiency*

No unusual activity	56	Acute cholecystitis	1
Hemorrhage	10	Acute pancreatitis	1
Pulmonary embolism	8	Gastroenteritis	1
Unusual effort	6	Hypertensive crisis	1
Tachycardia	3	Postsympathectomy	1
Surgical procedure	3	Carbon monoxide	1
Excitement	2	Tobacco and alcohol	1
Meal	1	Addison crisis	1
Trauma	1	Asthma	
Acute left heart failure	1		

the effect of trauma on the heart.[18] It will be necessary to differentiate contusion of the heart, coronary insufficiency secondary to trauma, and coronary occlusion. The electrocardiogram enables this distinction to be made in most cases, since RS-T elevation and Q waves appear, with rare exceptions, only in coronary occlusion.

COMMENT

When acute coronary occlusion and coronary insufficiency are differentiated, the latter is found to be a common condition.[4] It is associated with a precipitating factor in one-third to one-half the cases. On the other hand, coronary occlusion follows unusual exertion in only 2%. It is because of these rare cases, in which coronary occlusion occurs immediately after strain and therefore seems to be directly related to it, that the relation of coronary occlusion to effort remains a moot question. If the incidence of attacks in our series occurring during sleep, rest, mild or moderate activity, and walking is compared with the percentage of time during the day usually spent in each category, a close correlation is found. Thus,

about half the attacks began during sleep and rest and the majority of persons spend half the day in this way. Therefore, these activities may be considered coincidental. Similarly, the association of only 2% of the coronary occlusion attacks with severe exertion is also coincidental. Most persons perform some unusual effort at least several times a day, e. g., lifting a load, moving furniture, running after a bus, or parking a car in a small space. If effort were a precipitating factor in coronary occlusion, the incidence of attacks during strain should be much greater.

Another reason for believing that coronary occlusion and effort are not causally related, even when they occur simultaneously, is the fact that the formation of a coronary thrombosis takes place over a variable period, which occasionally extends over several weeks.[20] During this interval premonitory symptoms are present in approximately half the patients, but there may be none at all. It is probable, therefore, that, in the rare cases in which the acute attack occurs during, or soon after, strain, the occlusion has already completely formed, but there were no symptoms of infarction, because of adequate collateral circulation, until the effort was performed. Therefore, the exertion may account for the appearance of symptoms and even death, but not for the coronary occlusion that had occurred spontaneously. This belief is supported by the observations of Yater and his associates, who found previously organizing thrombi in 38% of their cases of fatal coronary occlusion apparently associated with effort and in only 11% of those in which the patients died in bed.[8m]

We believe coronary occlusion is the end result of the atherosclerotic process and in many cases is initiated by a subintimal hemorrhage. Some writers have assumed that effort, by suddenly raising aortic blood pressure, causes subintimal hemorrhage and, therefore, coronary occlusion; however, there is no evidence for this supposition, which is wholly theoretical. It has not been demonstrated that a rise in systemic pressure is transmitted to the coronary capillaries or that it may cause subintimal hemorrhage. Winternitz [21] injected fluid into the coronary arteries post mortem at a pressure of 500 mm. without producing hemorrhage. Furthermore, at necropsy we found intimal hemorrhage as frequently in nonhypertensive hearts and in those of persons who had been bedridden as in hypertensive hearts and those of active persons. It is likely that subintimal hemorrhage is part and parcel of the arteriosclerotic process and is uninfluenced by external factors.

For similar reasons, we believe that bed rest does not induce coronary occlusion. It has been suggested that a drop in blood pressure and slowing of the circulation, which occur in shock or sleep, may be conducive to the formation of coronary thrombosis, but there is no proof of this contention.[22]

The relation of coronary occlusion, coronary insufficiency, and angina pectoris to effort may be summarized as follows: Effort produces angina pectoris in almost 100% of cases and coronary insufficiency in about 50%; coronary occlusion occurs coincidentally with effort only in rare cases. This may be stated in another way. The majority of attacks of coronary occlusion occur during rest or sleep; coronary insufficiency often does; and angina pectoris rarely does.

It may be pertinent to point out that coronary occlusion almost never, if at all, results from the breaking off of sclerotic plaques in a diseased coronary artery, as has sometimes been suggested.[23]

It is often asked whether one attack of coronary occlusion predisposes to a subsequent attack. In our opinion there is no such relationship. Occlusion occurs spontaneously in a diseased artery, and this process is not influenced by previous thrombosis and infarction in another area of the heart. The second attack often occurs when the patient is well and has made an excellent recovery from the first attack. It is the result of the underlying atherosclerotic process. Although in rare instances only one coronary artery is diseased when coronary occlusion has occurred, it may be assumed that, as a rule, other arteries are also sclerotic. A second occlusion may occur fortuitously in one of these at any time. Even when a subsequent attack occurs soon after the first, i. e., during the first six weeks, there is probably no causal relationship.

In industrial compensation the problem of determining the role of effort in the onset of coronary occlusion is complicated by economic considerations. In giving his history it is natural for the worker to be influenced by this factor. The vast majority of persons are instinctively honest, but the need for economic compensation may distort their judgment and point of view. It is our opinion that only once in 10 to 20 cases is a true story obtained. Frequently a worker who has experienced angina for a number of years and has consulted physicians for the condition has denied ever having been sick.[24] Also, we remember the butcher's helper who sustained a coronary occlusion on a Sunday during a card game at a friend's house but wished to report that the attack had occurred on Thursday during work. It is not uncommon for the laborer, on admission to the hospital, to state that the attack occurred spontaneously; yet several weeks later he changes his story and relates the onset of the attack to some strain. He is also likely to record as very unusual and strenuous activity which for him has been routine for many years. Obviously such work, even if severe, should not be blamed for producing coronary occlusion. Even when there is no conscious falsification, most persons tend to relate the onset of pain to a specific event, even if there is no actual connection. Furthermore, they are inclined to overlook or forget the fact that they had not felt well prior to the unusual effort. In the near future it is likely that the compensation laws will be amended so that the worker will receive compensation whenever he becomes ill while at work, regardless of previous illness. This has already been done in New York State. It will then be possible to obtain more accurate histories and, thus, a truer idea of the relation between effort and coronary occlusion. We have already alluded to the fact that the process of formation of a coronary occlusion usually goes on for some time. During this period symptoms may or may not be present. In many cases in which coronary occlusion is supposed to have been precipitated by effort, a detailed history discloses the onset of symptoms prior to the exertion. We believe that, in bona fide cases of coronary occlusion which start during or immediately following strain, the occlusion has already formed, perhaps asymptomatically. The strain was sufficient to produce

symptoms of infarction and even death. The effort may be compensable as an aggravating factor but not as a causative one.

It is obvious that, in the evaluation of compensability, numerous complicated elements of the case must be considered and complete neutrality practiced by both the worker and the carrier. Each case must be decided on the basis of a complete history, in which the following points are considered: (1) evidence of previous cardiac symptoms or disease; (2) exact time of onset of symptoms in relation to the strain; (3) the type and severity of the strain; and (4) the type of disturbance sustained, i. e., coronary thrombosis or insufficiency.

Not infrequently, in compensation cases involving the occurrence of coronary occlusion after effort, the patient claims that he was completely asymptomatic prior to the strain and that, therefore, the effort caused the disease. Such a history, even if true, does not establish causal relationship, since it may be taken for granted that coronary artery disease always antedates coronary occlusion, whether or not there were symptoms prior to the occlusion.

The interval elapsing between an effort or trauma and the onset of coronary episodes is of great importance in determining causal relationship. In coronary insufficiency, symptoms usually set in immediately; if they appear after one to two hours, it is unlikely that they were caused by the strain. In coronary occlusion, the sequence is less direct since it may take some time for a thrombus to form. However, one would expect some symptoms, such as pain or weakness, within the first day or two if there has been a change in an artery. If there are no symptoms for 48 hours following effort or trauma, and a coronary occlusion develops later, it was probably not caused by the effort or trauma.

One is always faced with the question of length of disability following recovery from a coronary occlusion. Obviously, this varies in each case. Disability may be permanent, for example, if congestive failure sets in. However, many persons, particularly those under 50, recover completely and are able to return to work within three to six months.[25] About half the patients are able to resume moderate work and are in a better psychological state when they do. How strenuous the work may be must be determined in each case. It is a great error, in many cases, to restrict activity more than is essential. If working induces angina which is not present at rest, restriction is indicated. In general, it is wise to avoid a job in which collapse will endanger the safety of others. In selected cases who have been observed for a considerable time, manual labor of moderate degree may be allowed under supervision.[26]

Since acute coronary insufficiency depends on an inadequate coronary flow, which may be initiated by numerous conditions, it may be compensable. This is true, for example, when it follows effort, trauma, or operation. As a rule the period of disability does not exceed several weeks, but coronary insufficiency may be fatal and occasionally leads to incapacitating symptoms, such as angina, for a varying period. It may even lead to congestive failure for a considerable period or even for life. If, as is usual, the symptoms are brief and the electrocardiogram returns to normal within a week or two, the period of compensation may be one or two months.

A difficult question is posed by the patient who had never experienced angina prior to a specific unusual strain and then complains of a persistent anginal syndrome. The symptoms immediately following the effort may be ascribed to acute coronary insufficiency and may, therefore, continue for one to several weeks or possibly several months; during this period compensation is warranted. However, this should not lead to chronic angina unless we invoke the theory of setting off a trigger mechanism. In that case it is reasonable to assume that the anginal syndrome probably would have appeared spontaneously at about the same time or as the result of some other trigger mechanism. The problem becomes even more complex if, following the strain and the subsequent angina, coronary occlusion occurs after several months. It is probable that there is no causal relationship between the effort and the occlusion in these circumstances.

The answers to some of these questions cannot be given with certainty, and much work remains to be done in this field. It is essential to approach the problem in a spirit of impartiality and to pay particular care to the use of correct terminology. In this way alone will it be possible to clarify much of the confusion and disagreement that now exist.

SUMMARY

The activities preceding the onset have been studied in 2,080 attacks of acute coronary occlusion and in 100 episodes of acute coronary insufficiency.

Coronary occlusion and insufficiency can be differentiated electrocardiographically in 95% of the cases. Coronary occlusion produces through-and-through infarction. Coronary insufficiency causes only subendocardial necrosis. Coronary insufficiency is at least as common as coronary occlusion.

The onset of coronary occlusion was associated with unusual effort in only 2% of the cases. Reasons are given for considering the association coincidental. Coronary occlusion is a spontaneous event in the course of atherosclerosis. Occupation, season, and time of day did not influence the incidence of coronary occlusion. The onset was spontaneous in 56 of 100 attacks of coronary insufficiency. In the remaining 44 the commonest precipitating factors were hemorrhage, pulmonary embolism, effort, tachycardia, operation, excitement, and meals. Angina pectoris almost always is related to effort; coronary insufficiency is related to effort in about half the cases and coronary occlusion only rarely and coincidentally. Trauma may produce contusion of the heart or coronary insufficiency. The criteria for establishing compensability in acute coronary episodes are discussed. The following theoretical problems are considered: relationship of one attack of coronary occlusion to a subsequent one; length of disability and employability following coronary occlusion; and causal relationship of effort to permanent angina pectoris. In general, the outlook for the worker after coronary occlusion is much better than was formerly thought. One-half to two-thirds of patients return to gainful employment within one year. In coronary insufficiency the prognosis is even better.

Fifth Ave. and 100th St.

RADICAL PROSTATECTOMY AFTER PREVIOUS PROSTATIC SURGERY

TECHNICAL PROBLEMS ENCOUNTERED IN TREATMENT OF OCCULT PROSTATIC CARCINOMA

Willard E. Goodwin, M.D., Los Angeles

It has been demonstrated that Young's radical perineal prostatectomy, which involves removal of the prostate and the seminal vesicles, is the treatment of choice for early cancer of the prostate gland.[1] Occult or unsuspected carcinoma of the prostate discovered accidentally after biopsy or conservative prostatectomy by any route is usually early. It probably occurs in at least 9% to 10% of men over 50 years of age [2] and is thus a real problem.

Hinman and Hinman, in discussing the justification for radical prostatectomy after previous operative discovery of unsuspected prostatic carcinoma, concluded, ". . . radical perineal prostatectomy seems indicated if an apparently localized area of carcinoma is found either on transurethral resection or on open prostatectomy." [3] Nesbit and Baum have recently questioned the above statement in the light of present available survival statistics with conservative therapy.[4]

The present study concerns 23 cases of radical prostatectomy after previous prostatic surgery from August, 1948, to March, 1951. Since during this same period a total of 69 patients were subjected to radical prostatectomy in the Brady Urological Institute, Johns Hopkins Hospital, the present series represents about a third of all the radical operations on the prostate performed there in the period of study. This figure emphasizes the importance of evaluation of these cases. Because of the brief period since operation, no attempt is made in this paper to justify radical prostatectomy for occult carcinoma in terms of curability. Jewett's study [1b] has provided ample grounds for expecting over 50% five-year cures in cases with early carcinoma treated by radical prostatectomy.

This series of 23 patients subjected to radical prostatectomy after previous operation on the prostate was collected in a period of less than three years and attests to the enthusiasm in this clinic for radical prostatectomy in "selected cases" when the surgeon believes the cancer is curable. Current opinion and practice at the Brady Urological Institute may be expressed as follows: "When carcinoma of the prostate is demonstrated in a patient with a life expectancy of 10 years or more, it should always be removed by radical prostatectomy when the surgeon believes it is totally removable and when the patient is a good operative risk."

This paper is an attempt to answer or discuss the following questions: Does radical prostatectomy after previous prostatic surgery differ technically from the operation in an untouched case? Should technical problems influence the operator's judgment? What is the optimum time between operations? What is the operative route of choice? Are complications greater? Are operative mortality and morbidity significantly influenced in these cases?

Interest in these questions was aroused when a 57-year-old Negro (Case 1, Table 3) came under my care. On Sept. 1, 1948, uncomplicated suprapubic prostatectomy was performed. The pathologist's report described hyperplasia and previously unsuspected adenocarcinoma of the prostate. Twelve days later radical perineal prostatectomy was undertaken but had to be abandoned in favor of subtotal perineal prostatectomy because of operative difficulties. The usual perineal exposure was uncomplicated, but radical prostatectomy was impossible because the remaining prostate was so thin and the tissues were so friable and edematous from the previous procedure that the prostate was removable only piecemeal. A comment at the end of the operative note states, "This was the operator's first attempt to remove radically a carcinoma of the prostate following prostatectomy by another method. I believe the lesson to be learned is that, if this procedure is to be carried out, it should be done at a greater interval after the previous operation."

TABLE 1.—*Evaluation of Operative Difficulty*

Degree of Difficulty	Interpretation
0	No unusual difficulty
1	Operator notes altered conditions
2	Adhesions and/or obliteration of landmarks
3	Prostate removed piecemeal, or serious operative complication
4	Operation abandoned or unsatisfactory to surgeon

After the preceding experience, it was of interest to observe similar cases. The 23 radical operations discussed here were done by eight different surgeons. Four of them were my own cases. I assisted the operator in eight cases and observed five others. The other six are evaluated from the operative notes or from conversation with the surgeon. An estimate of degree of operative difficulty was made in each case (Table 1) and represents, of course, my subjective judgment of the situation. No difficulty or first degree difficulty was interpreted as indicating that the previous operation did not materially affect the later radical operation. Third and fourth degree difficulties marked serious interference with the normal course of the operation and suggested that the operation could probably not be expected to effect a cure.

Read before the Section on Urology at the One-Hundredth Annual Session of the American Medical Association, Atlantic City, June 14, 1951.

From the James Buchanan Brady Urological Institute, the Johns Hopkins Hospital. Dr. Goodwin is now at the University of California at Los Angeles, Department of Surgery, Urology, School of Medicine.

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3. Hinman, F., Jr., and Hinman, F.: Occult Prostatic Carcinoma Diagnosed upon Transurethral Resection, J .Urol. **62**: 723-729, 1949.

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Most of the information is summarized in tables, which are self-explanatory. For purposes of comparison as to difficulty of operation, the cases have been divided into groups, depending on the type of previous prostatic surgery: after simple perineal prostatectomy (Table 2), after suprapubic or retropubic prostatectomy (Table 3), after perineal biopsy of the prostate (Table 4), and after transurethral resection of the prostate (Table 5).

One radical prostatectomy after two previous transurethral resections was done for seminal tract tuberculosis (Case 2, Table 5). The operations in all the remaining 22 cases were done for prostatic carcinoma. Cancer was demonstrated on microscopic section in only 15 of the 22 cases after secondary radical prostatectomy. Five cases showed "no carcinoma," though previous sections were positive. In two cases no pathology reports were available. Time elapsed between previous surgery on the prostate and radical prostatectomy varied from six hours to six months, depending on the situation and the surgeon. Most of the patients had all operations in this hospital. Some, after discovery of occult carcinoma following transurethral resection elsewhere, were sent to this clinic for radical prostatectomy.

Most of the radical prostatectomies were by the perineal route. However, two radical retropubic prostatectomies were done. One (Case 6, Table 5) was without particular difficulty. The other (Case 3, Table 2) was elected in the hope that a new approach to the previously surgically treated prostate would make the operation easier. This was not the case, however, as the gland was removed piecemeal. The difficulties, when they exist in these cases, are not in the approach but rather in the facile removal of the complete prostate, seminal vesicles, and cuff of bladder in a single surgical specimen without violation of the fascial coverings. One patient (Case 3, Table 5) had radical prostatectomy and cystectomy by the combined perineal and abdominal route for carcinoma of the prostate invading the bladder. He is included because the same approach as for radical perineal prostatectomy was used and the same problems were encountered as in the other cases.

In two cases the operation had to be abandoned because it was apparent to the operator that further operative trauma would be useless and might be damaging (Case 1, Table 3, and Case 4, table 2).

There were no operative deaths in this small series. Two patients are known to have died elsewhere, one of heart disease and one in uremia with suspected but not proved recurrence (Case 3, Table 2). Not all the other patients were traceable in the interval since they have left the hospital.

TABLE 2.—*Radical Prostatectomy After Simple Perineal Prostatectomy*

Case No.	Date of Operation	Time Between Previous Operation and Radical Prostatectomy	Type of Radical Prostatectomy	Pathology Specimen	Post-operative Hospitalization, Days	Post-operative Incontinence	Complications	Late Post-operative or Present Status	Estimated Operative Difficulty *
1	March, 1949	18 days	Perineal	Carcinoma of prostate	20	0	None	Excellent	2
2	April, 1949	9 days	Perineal	Carcinoma of prostate	18	0	None	Excellent	3
3	May, 1950	18 days	Retropubic radical	No carcinoma demonstrated	20	Unknown	Unknown	Died in another hospital; uremia; recurrence (?)	3
4	June, 1950	1 mo.	Attempted perineal, abandoned	No specimen	10	0	None	Normal (carcinoma probably present)	4

* See Table 1.

TABLE 3.—*Radical Prostatectomy After Suprapubic or Retropubic Prostatectomy*

Case No.	Date of Operation	Time Between Previous Operation and Radical Prostatectomy	Type of Radical Prostatectomy	Pathology Specimen	Post-operative Hospitalization, Days	Post-operative Incontinence	Complications	Late Post-operative or Present Status	Estimated Operative Difficulty *
1	Sept., 1948	12 days (suprapubic)	Attempted perineal; subtotal perineal	Carcinoma of prostate	14	Partial incontinence	None	Unknown	4
2	Feb., 1950	55 days (retropubic)	Perineal	No carcinoma	17	0	None	Excellent	2
3	Jan., 1951	6 mo. (suprapubic) 5 mo. (TUR)†	Perineal	No carcinoma	20	Stress incontinence, early	None	Satisfactory	3

* See Table 1. † Transurethral resection.

Postoperative hospitalization for all cases including ones with complications averaged 22 days, which compares favorably with the expected average, 18 to 19 days, in uncomplicated cases.[4a] One patient is totally and one partially incontinent. Four patients show slight stress incontinence, but two of them have been operated on so recently that they may be expected to gain full control within the year. Sixteen had no incontinence, and one could not be followed. Complications of operation were surprisingly few, though greater than average. There were three patients in whom severe strictures developed (Cases 1, 6, and 8, Table 5). One suffered transient ulnar palsy, and in one thrombophlebitis developed. One who had a negative perineal biopsy at 8 a. m. was returned to the operating room for a second anesthetic and the radical operation the same afternoon, the morning biopsy having later been reported as positive. His postoperative course was complicated by pneumonia, hemorrhoids, and slow wound healing (Case 5, Table

4a. Goodwin, W. E.: On Postoperative Hospitalization, Urological Survey **1**: 550-551, 1951.

4). The end result in this case, however, is satisfactory as it is in most of the others.

Inspection of the last column in the tables shows the varying degrees of difficulty experienced in radical prostatectomy following different types of operations. In general, but not always, the operations after previous prostatic adenomectomy by any of the open routes have been very difficult. Thus in five of the seven cases in Tables 2 and 3 there was serious interference with the normal operative procedure. By contrast, radical prostatectomy after previous transurethral resection was usually uneventful.

and led to the complication of severance of the ureter and piecemeal removal of the carcinomatous prostate. The end result in this case is to date excellent, in spite of the severe operative trauma, but in this and some of the other extremely difficult cases one wonders whether the operation was justified.

An attempt was made to learn of the experiences in other clinics under similar circumstances. Some surgeons could not recall having done a radical prostatectomy after previous prostatic surgery. Others remembered a few cases after transurethral operations, where the oper-

TABLE 4.—*Radical Prostatectomy After Perineal Biopsy*

Case No.	Date of Operation	Time Between Biopsy and Radical Prostatectomy	Type of Radical Prostatectomy	Pathology Specimen	Postoperative Hospitalization, Days	Postoperative Incontinence	Complications	Late Postoperative or Present Status	Estimated Operative Difficulty *
1	April, 1949	2 days	Perineal	Carcinoma of prostate	26	0	Transient ulnar palsy	Excellent	2
2	Aug., 1950	7 days	Perineal	Carcinoma of prostate	21	Slight stress	None	Satisfactory	0 Probably easier
3	Aug., 1950	6 weeks (Previous TUR's † 10 yr.; 5 wk.)	Perineal	Carcinoma of prostate	17	0	Left ureter cut at operation; repaired	Excellent	3
4	Feb., 1951	7 days	Perineal	Carcinoma of prostate	23	0	None	Excellent	1
5	Feb., 1950	6 hr.	Perineal	No pathology report	27	0	Pneumonia, hemorrhoids, slow healing	Good	0
6	Jan., 1951	5 days	Perineal	Carcinoma of prostate	40	0	Thrombophlebitis	Good	0 Easier
7	Jan., 1951	5 days	Perineal	Carcinoma of prostate	19	Stress incontinence, early	None	Good	3

* See Table 1. † Transurethral resection.

TABLE 5.—*Radical Prostatectomy After Transurethral Resection*

Case No.	Date of Operation	Time Between T U R * and Radical Prostatectomy	Type of Radical Prostatectomy	Pathology Specimen	Postoperative Hospitalization, Days	Postoperative Incontinence	Complications	Late Postoperative or Present Status	Estimated Operative Difficulty †
1	Aug., 1948	4 mo.	Perineal	Carcinoma of prostate	35	0	Stricture; dilatation elsewhere	Excellent	3
2	Sept., 1948	4 yr.	Perineal (rad. sem. tract)	Seminal tract tuberculosis	19	0	None	Excellent	0
3	March, 1949	2½ mo. 4 wk.	Radical cystect., perineal & abdom.	Carcinoma of prostate	30	0	None	Excellent	2
4	April, 1949	2½ mo.	Perineal	Carcinoma of prostate	28	Slight stress	None	Satisfactory	0
5	May, 1949	3 wk.	Perineal	Carcinoma of prostate	37	Incontinent	Wears urethral clamp	Unknown	1
6	Oct., 1949	11 mo. 2½ mo.	Retropubic	Carcinoma of prostate	14	0	Urethral stricture; cystostomy	Unknown	1
7	Sept., 1950	1 mo.	Perineal	Carcinoma of prostate	18	0	None	Satisfactory	1
8	Jan., 1951	10 days	Perineal	No carcinoma	18	0	Stricture	Satisfactory	0
9	Dec., 1950	10 days 5 days	Perineal	No carcinoma	21	0	None	Excellent	0

* Transurethral resection. † See Table 1.

complicated or presented minimal difficulties. The operators often noted the area of resection and sometimes found the prostatic capsule rather thin, but only in one of the nine cases in Table 5 was operation inordinately difficult. The same was true of operations performed after perineal biopsy, particularly when they were performed soon after, before complete healing in the operative site. One patient (Case 3, Table 4) was an exception to this; he had had two previous transurethral operations and a perineal biopsy before the radical operation. In this case all landmarks were obliterated by adhesions, which necessitated sharp dissection throughout the operation

ative difficulty was not increased. Smith [5] recalled a total perineal prostatectomy that he did two weeks after a previous perineal enucleation. His operative note describes "some difficulty until the lateral margins of the prostate were identified after which the operation was carried out in the usual manner." Shaw [6] states that radical prostatectomy in three or four cases after perineal biopsy at a previous operation was "not found to be technically difficult." These results are similar to those in Table 4 of

5. Smith, G. G.: Personal communication to the author.
6. Shaw, E. C.: Personal communication to the author.

this series. Hinman [7] reviewed operative notes in nine of the cases he had previously reported.[1f] One of the patients, operated on in 1942, had had suprapubic prostatectomy in 1937 and two transurethral resections in 1938. The operative note describes ". . . great difficulty, because of fibrosis incident to previous operative procedures. . . ." This closely parallels some of the cases summarized in Table 3. The other cases in his series after transurethral resection were often more difficult than an untouched case, but the difficulties did not prevent radical prostatectomy. In summary, the operative difficulties in his clinic were comparable to those observed here.

RADICAL PROSTATECTOMY AFTER TRANSURETHRAL RESECTION

Prostatic carcinoma was demonstrated in the specimen removed at radical prostatectomy in six of eight cases after previous transurethral resection had shown cancer (Table 5). This seems to indicate that resection alone in this group did not offer hope of total removal and possible cure in any substantial number of cases. Since previous resection, except in one case, did not markedly increase the difficulty of later total prostatectomy, it would seem that radical prostatectomy is justified in this group if the operator feels the disease is curable. The time interval between first and second operation did not seem to matter, though multiple previous operations in this group (as in Hinman's series [7]) usually tended to increase the operative difficulty.

RADICAL PROSTATECTOMY AFTER PERINEAL BIOPSY

It is the custom in this clinic to perform perineal biopsy for frozen section study of suspected malignant lesions of the prostate which are considered curable. In the great majority of cases radical perineal prostatectomy follows immediately on the positive report of carcinoma from frozen section. Occasionally, when the frozen section is reported negative and the patient is returned to bed without further operation, a subsequent report on the permanent sections from the biopsy specimen shows carcinoma. These cases make up Table 4. In all cases of this group in which a pathologist's report was rendered on the specimen after radical prostatectomy, carcinoma was demonstrated. Operative difficulty, except in Cases 3 and 7, was not materially increased, and the radical operation seems well justified in these cases when cure is possible. The time interval here is probably important, as the surgeons usually approached the prostate through the same incision previously employed, before healing was complete. In some cases this actually made the operation easier. It would seem from study of this group that the radical operation should be done two to seven days after perineal biopsy if possible.

RADICAL PROSTATECTOMY AFTER OPEN ADENOMECTOMY BY ALL METHODS

As mentioned before, the greatest operative difficulties were encountered after previous open enucleation of the prostate by any route. Even when the same route was used, these difficulties occurred not so much in the approach as in the attempted complete surgical removal of the remaining prostate and vesicles. In only two of the seven cases in Tables 2 and 3 was the operation without severe technical difficulty. In two of the cases operation was abandoned as "impossible." Also of interest in the cases after open adenomectomy was the fact that no carcinoma was reported by the pathologists in three of the six cases in which an operative specimen was submitted. This suggests that the "occult carcinoma" found in the previously enucleated adenoma was totally removed by the first operation in half the cases, though admittedly the series is too small to be significant in this report. Still, in some of the remaining cases in which carcinoma was demonstrated, it may not have been completely removed by the radical operation. In Case 2, Table 2, the operative note describes removal of the left seminal vesicle and vas separately, and a follow-up note two years later describes a nodule in that area that may represent local recurrence, though the patient is in excellent condition and completely asymptomatic. In Case 1, Table 3, carcinoma was definitely left behind as it was in Case 4, Table 2, where no attempt was made to remove it. The time interval between first and second operation may be important here. In the cases in which operation was done at 9 and 12 days, and in 1 of the cases at 18 days, friable tissue, edema, and marked inflammation were noted in the prostate, making the conventional easy complete removal of an intact specimen impossible. It is not proved from this study, but it seems likely that radical prostatectomy after previous open enucleation should be postponed for at least 30 days if it is to be done at all.

The question of the optimum route of removal is not settled here. In this clinic the perineal approach is favored as being easy and safe, allowing for complete exposure and removal of the whole specimen under direct vision. It also allows good anatomical closure under vision. Radical retropubic prostatectomy, particularly after a previous perineal approach, may have its useful place. This may be particularly true after many months have elapsed between the first and second operation and firm scarring has occurred. It would appear, however, from the data in Tables 2 and 3 that the approach to the prostate via the retropubic method (after previous perineal surgery) or via the perineal method (after previous suprapubic or retropubic operation) is of no particular advantage or disadvantage. The operator should probably use the approach for which he is best trained.

SUMMARY AND CONCLUSIONS

Unexpected discovery of carcinoma in prostatic tissue removed by previous operation raises the question of whether radical prostatectomy should be performed in such cases. This study does not answer the question directly but attempts to aid in making the decision. An opinion is expressed: When carcinoma of the prostate is demonstrated in a patient with a life expectancy of 10 years or more, it should always be removed by radical prostatectomy when the surgeon believes it is totally removable and when the patient is a good operative risk. The question of removability and technical problems encountered in radical prostatectomy after previous prostatic surgery are discussed in relation to a series of questions which are answered here:

Radical prostatectomy after previous prostatic surgery often differs technically from the operation in an untouched case. It may be more difficult. After transure-

7. Hinman, F., Jr.: Personal communication to the author.

thral resection or perineal biopsy, the difficulties are slight or nonexistent. After open adenomectomy by any route, radical prostatectomy is nearly always more difficult and may be impossible.

Technical problems should influence the operator's judgment and decision concerning operability; i. e., in some cases there is no use to attempt radical prostatectomy if it is foredoomed to failure (Case 1, Table 3; Case 2, Table 2). In general, the consideration of technical difficulties need not enter into the question of operation after previous transurethral resection or perineal biopsy. After previous open adenomectomy, they should be carefully weighed in the decision to operate or not to operate.

The optimum time between the first operation, when unexpected operable carcinoma is discovered, and subsequent radical prostatectomy depends on the type of previous operation. In cases in which radical prostatectomy is to follow transurethral resection or perineal biopsy, the sooner the better. After previous open operations, an interval of at least a month is probably advisable.

The operative route of choice depends on the surgeon's training. Radical perineal prostatectomy is favored in this clinic on the basis of exposure and visibility both for removal and for closure. There may be some advantage after previous operation by one route to do the radical by another, though this is not demonstrated in this small series. The surgeon should choose the route for which he is best trained.

Complications may be greater when radical prostatectomy is done after a previous operation on the prostate, particularly after previous open operation. The difference is slight, however, except for operative difficulties, and this factor should not necessarily influence the surgeon's decision regarding the advisability of operation.

Operative mortality and morbidity are not significantly influenced in these cases.

It is concluded:

1. Radical prostatectomy after open adenomectomy by any route is almost always more difficult and is sometimes impossible. When the operation is undertaken, it probably is wise to wait at least one month or longer until complete healing has occurred.

2. Radical prostatectomy after previous perineal biopsy is usually as easy or easier than in an untouched case, provided the operation is done soon after biopsy. It should always be undertaken when a cure is possible.

3. Radical prostatectomy after previous transurethral resection showing unexpected carcinoma of the prostate is little or no different from a case without previous operation. Radical prostatectomy should always be done as soon as possible under these circumstances if the operator thinks that the cancer is curable and the patient is a good surgical risk with a life expectancy of 10 years or more.

148
952

VAGOTOMY IN THE TREATMENT OF GASTROJEJUNAL ULCERATION

A POSTOPERATIVE CLINICAL AND LABORATORY STUDY

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The clinical features and the immediate postoperative results have been studied in 118 cases of gastrojejunal ulcer and four cases of gastroduodenal ulcer (table 1) in which vagotomy has been performed at the Mayo Clinic from 1945 to January, 1951. In the group in which the abdominal approach was used, marked jejunitis or actual ulcer with crater found at operation is included as a case of gastrojejunal ulcer. In cases in which the thoracic approach was used, the diagnosis was based on the clinical and laboratory findings. Results have been determined one to five years after operation by reexamination and laboratory studies in 13 of these cases and from questionnaires in 84. During the interval under consideration more patients returned for examination and laboratory studies, but these figures represent the means by which the latest information was obtained. Seventeen patients were operated on less than one year before the date of this writing.[1] No follow-up data were available on four patients.

Besides the 122 cases of gastrojejunal ulceration, we have studied eight cases of gastrojejunocolic fistula in which vagotomy was performed. Follow-up studies of more than one year were available in seven of these cases.

There were two hospital deaths in the series; one was due to cerebral hemorrhage one month after operation and the other to uremia on the 26th postoperative day. Two other patients died of unrelated conditions 6 weeks and 13 months, respectively, after vagotomy (table 1).

The symptoms and signs of gastrojejunal ulceration are recurrent intractable pain, hemorrhage that has proved refractory to medical management, roentgenologic evidence of a gastrojejunal ulcer, a nonfunctioning gastroenteric stoma, or reactivation of a duodenal ulcer, which when it occurs is always secondary to a malfunctioning gastroenteric stoma. These are considered indications for operations.

PERTINENT OBSERVATIONS

In 47 of our cases gastrojejunal ulcer developed after gastroenterostomy. The gastroenterostomy was performed an average of 9.3 years prior to the vagotomy

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1. We believe that this is too short a period in which to evaluate results.

(table 2). In the 75 cases in which gastrojejunal or gastroduodenal ulcer developed after gastric resection, the average lapse of time between gastric resection and vagotomy because of symptoms of recurring ulceration was 3.3 years.

In 34 of the cases of gastrojejunal ulcer after gastroenterostomy the abdominal approach was used. Thirty of these patients had had previously performed posterior gastroenterostomy, and four had had anterior anastomosis.

The abdominal approach was used for vagotomy in 31 cases of gastrojejunal ulcer after gastric resection. In 12 cases less than 70% of the stomach had been resected previously. In two of the four cases of gastroduodenal ulceration, the ulcer developed after less than 70% of the stomach had been resected and Billroth I anastomosis performed. Four of the gastrojejunocolic fistulas occurred after posterior gastroenterostomy, three after gastric resection with posterior colic anastomosis, and one after gastric resection with antecolic anastomosis.

66% accurate in demonstrating gastrojejunal and gastroduodenal ulceration. This is in contrast to 97% accuracy in demonstration of duodenal ulceration. In our series, figures, of course, can be presented only from the 68 cases of gastrojejunal or gastroduodenal ulcer in which the transabdominal type of vagotomy was used, since only by this method could the presence of a gastrojejunal or gastroduodenal ulcer be verified. Of these 68 patients, 13 were found at operation to have marked jejunitis with no definite evidence of an ulcer crater. The roentgenologic diagnosis of jejunitis was made in 2 of these 13 cases preoperatively, and no abnormality was apparent in the roentgenograms in the other 11 cases. In 37 (67.2%) of the remaining 55 cases in which gastrojejunal or gastroduodenal ulceration was proved surgically, a correct preoperative roentgenologic diagnosis was made. In one case a roentgenologic diagnosis of large gastrojejunal ulcer was made and only jejunitis was found at operation. These findings illustrate the value of the abdominal approach in order to verify the diagnosis whenever a study of the effects of vagotomy is being made.

TABLE 1.—*Cases of Gastrojejunal and Gastroduodenal Ulcer*

Type of Operation	No. Patients	Approach		Follow-Up										Less Than 1 Yr. P.O.	No Follow-Up	Deaths
		Thoracic	Abdominal	1 Yr.		2 Yr.		3 Yr.		4 Yr.		5 Yr.				
				E*	Q†	E	Q	E	Q	E	Q	E	Q			
Gastrojejunal ulcer after gastroenterostomy																
Vagotomy alone	39	13	26	2	8	1	10	..	4	1	7	..	1	4	..	1
Vagotomy and gastric resection	3	..	3	..	2	..	..	..	..	..	..	..	..	1	..	..
Vagotomy and anastomosis taken down	5	..	5	..	1	..	..	..	..	1	1	..	2	..	..	..
Gastrojejunal ulcer after gastric resection																
Vagotomy alone	62	40	22	..	7	3	11	..	14	3	7	..	3	8	4	2
Vagotomy and re-resection	9	..	9	2	..	..	3	..	..	..	..	..	..	3	..	1
Gastroduodenal ulcer after gastric resection																
Vagotomy alone	2	1	1	..	..	..	..	..	..	..	1	..	..	1	..	..
Vagotomy and re-resection	2	..	2	..	..	..	2	..	..	..	..	..	..	..	..	..
Total	122	54	68	4	18	4	26	0	18	5	16	0	6	17	4	4

* Examination. † Questionnaire.

Hemorrhage.—Of the 41 patients (table 3) followed one to five years after vagotomy for gastrojejunal ulcer developing after gastroenterostomy, 16 had had moderate hemorrhage and seven massive hemorrhage before vagotomy. After vagotomy two of these 41 patients had moderate hemorrhage. In 22 of 56 patients who had gastrojejunal ulcer after gastric resection, traced one to five years, hemorrhage was moderate and in nine it was severe. After vagotomy moderate hemorrhage had occurred in two of these cases and severe hemorrhage occurred in one. All three patients had hemorrhages after vagotomy alone. None of the four patients who had gastroduodenal ulcer after Billroth I resection hemorrhaged either before or after vagotomy.

Accuracy of Roentgenograms in Demonstration of Gastrojejunal Ulcer.—Because of the position and often rapid emptying of the stomach through the gastroenteric stoma, roentgenologists at the clinic [2] claim to be only

2. Kirklin, B. R.: Roentgenologic Determination of Normal and Abnormal Results Following Operation on the Stomach and Duodenum, Am. J. Roentgenol. **33**: 468 (April) 1935; Personal communication to the authors.

3. Walters, W., and Belding, H. H., III: A Postoperative Physiologic and Clinical Study of Gastric Vagotomy in 130 Cases, South. M. J. **44**: 326 (April) 1951; Physiological and Clinical Studies of Vagotomized Patients; a Study of 331 Patients, A. M. A. Arch. Surg. **62**: 183 (Feb.) 1951. Walters, W., and Belding, H. H., III: Physiological Effects of Vagotomy; a Study of 331 Patients, J. A. M. A. **145**: 607 (March 3) 1951.

PHYSIOLOGIC STUDIES

Acidity.[3]—Studies reported herein were carried out on patients who were examined for gastric acidity one to five years after vagotomy. Gastric acidity was reduced below preoperative levels in six of the seven cases in which vagotomy alone had been performed for gastrojejunal ulcer after gastroenterostomy and in all 12 such cases in which it had been performed for gastrojejunal ulceration after gastric resection. It is appreciated that such studies may be suspected of error owing to reflex of alkaline duodenal contents and biliary and pancreatic secretion into the stomach.

Motility.—Vagotomy alone reduced gastric motility immediately in 54.6% of 11 cases of gastrojejunal ulcer after gastroenterostomy and in 42.1% of 19 cases of gastrojejunal ulcer after gastric resection in which motility was studied. One to five years after vagotomy alone, however, motility was found to be reduced or absent on reexamination in 16.7% of 12 cases of gastrojejunal ulcer after gastroenterostomy and in 8.3% of 12 cases of gastrojejunal ulcer after gastric resection. Observations have been made in too few cases after other operations to be significant.

Insulin Tests.—Our method of performing the insulin test and criteria for a satisfactory test and negative or positive results differ somewhat from those of other investigators [4] and have been described in detail in previous publications. We have found a 75% good correlation [5] between results of the test and clinical results in our entire group of cases. However, of the six patients in the entire group who had proved recurrences five had undergone insulin tests, and for four of them results were negative.

TABLE 2.—*Time Between Gastric Resection or Gastroenterostomy and Subsequent Vagotomy*

Lesion	Cases	Months: Less Than 6	Months: 6-12	Years: 1-2	Years: 2-5	Years: 5-10	Years: 10 or More
Gastrojejunal ulcer after gastroenterostomy	47	1 2.1%	2 4.2%	2 4.2%	9 19.2%	13 27.7%	20 42.6%
Gastrojejunal or gastroduodenal ulcer after gastric resection	75	8 10.7%	10 13.3%	22 29.3%	22 29.3%	8 10.7%	5 6.7%

CLASSIFICATION OF RESULTS

We have classified results as stated in previous papers in three categories: (1) excellent when the patient had no symptoms of ulcer and no evidence of disturbances of motility secondary to the vagotomy, such as gastric retention, diarrhea, or bloating; (2) unsatisfactory when symptoms of disturbances of motility are present or when a return of pain would lead one to suspect the return of a recurrent ulceration but such recurrent ulceration is not proved; and (3) poor when recurrent ulceration is proved by roentgenologic examination, at operation, or both. Results were determined one to five years after vagotomy in 94 cases of gastrojejunal ulceration and in three additional cases of gastroduodenal ulcer.

RESULTS IN CASES OF GASTROJEJUNAL ULCER AFTER GASTROENTEROSTOMY

Vagotomy Alone.—In 11 of the 34 cases (table 4) vagotomy alone was performed by the transthoracic approach with excellent results in five, unsatisfactory results in five, and a poor result in one. The last patient had recurrence of the pain of ulcer three months after vagotomy, and six months after vagotomy the roentgenogram showed evidence of recurrent gastrojejunal ulceration. The diagnosis was confirmed at subsequent gastric resection. The insulin test in this patient gave a negative result. In 23 of these 34 cases the abdominal approach was used; the results were excellent in 16 and unsatisfactory in seven, in two of which there were symptoms of recurring ulceration.

TABLE 3.—*Follow-Up Studies on Fifty-Four Patients Who Hemorrhaged Before Vagotomy for Gastrojejunal Ulcer*

Operation Preceding Ulcer	Corrective Procedure	Moderate: Before Vagotomy	Moderate: 1 to 5 Yr. After Vagotomy	Massive: Before Vagotomy	Massive: 1 to 5 Yr. After Vagotomy
Gastroenterostomy	Vagotomy alone	14	1	6	0
	With gastric resection	1	0	0	0
	With anastomosis taken down	1	1	1	0
Gastric resection	Vagotomy alone	20	2	7	1
	With gastric resection	2	0	2	0
Total cases		38	4	16	1

Three of the patients in the entire group who had unsatisfactory results reported recurrent ulcer pain 1 year, 18 months, and 2½ years, respectively, after vagotomy alone. One of these three also reported a moderate gastrointestinal hemorrhage one year after vagotomy. In all three of these cases recurrence of ulcer was suspected, but the recurrence, of course, was not proved, and thus the results were classified as unsatisfactory. The results by years after vagotomy and by type of approach are shown in table 4.

Vagotomy Plus Excision of Gastrojejunal Ulcer and Closure of Openings in Stomach and Jejunum.—Follow-up data were available on all five patients one to five years after vagotomy. Three had obtained excellent results, one an unsatisfactory result due to recurrent ulcer type of pain one year after vagotomy, and one a poor result. This last patient showed recurrent duodenal ulcer with crater by roentgenologic examination 42 months after vagotomy. The insulin test in this case gave negative results. In one patient with an excellent result five years after vagotomy, ulcer pain developed three years after vagotomy and a reactivated duodenal ulcer was found on roentgenologic examination. The insulin test was negative. However, he has responded to medical treatment and is asymptomatic at present.

TABLE 4.—*Results of Vagotomy in Cases of Gastrojejunal Ulcer After Gastroenterostomy*

Operation	Approach	Year	No.	Results: Excellent	Results: Unsatisfactory	Results: Poor	Symptoms of Ulcer: No	Symptoms of Ulcer: Yes
Vagotomy alone	Thoracic	1	2	1	..	1	..	..
		2	3	2	1	..	..	..
		3	2	1	1	..	..	..
		4	3	..	3	..	..	..
		5	1	1	..	..	..	..
		Total	11	5 45.4%	5 45.4%	1 9.2%	9 81.8%	2 18.2%
	Abdominal	1	8	6	2	..	..	..
		2	8	6	2	..	..	..
		3	2	1	1	..	..	..
		4	5	3	2	..	..	..
		5	..	..	..	..	..	..
		Total	23	16 69.6%	7 30.4%	..	21 91.3%	2 8.7%
Vagotomy and gastric resection	Abdominal	1	2	1	1	..	..	..
		2	..	..	..	..	..	..
		3	..	..	..	..	..	..
		4	..	..	..	..	..	..
		5	..	..	..	..	..	..
		Total	2	1 50%	1 50%	..	2 100%	..
Vagotomy and anastomosis taken down	Abdominal	1	1	..	1	..	..	..
		2	..	..	..	..	..	..
		3	..	..	..	..	..	..
		4	2	1	..	1	..	..
		5	2	2	..	..	..	..
		Total	5	3 60%	1 20%	1 20%	3 60%	2 40%
Grand total			41	25	14	2	35	6

Three had had excellent results, one an unsatisfactory result due to recurrent ulcer type of pain one year after vagotomy, and one a poor result. This last patient showed recurrent duodenal ulcer with crater by roentgenologic examination 42 months after vagotomy. The insulin test in this case gave negative results. In one patient with an excellent result five years after vagotomy, ulcer pain developed three years after vagotomy and a reactivated duodenal ulcer was found on roentgenologic examination. The insulin test was negative. However, he has responded to medical treatment and is asymptomatic at present.

Vagotomy and Gastric Resection.—One of the two living patients who had gastric resection in addition to

4. Weinstein, V. A.; Hollander, F.; Lauber, F. U., and Colp, R.: Symposium on Some Aspects of Peptic Ulcer; Correlation of Insulin Test Studies and Clinical Results in a Series of Peptic Ulcer Cases Treated by Vagotomy, Gastroenterology **14**: 214 (Feb.) 1950.

5. "Good correlation" means that the patient had a negative result from an insulin test and no evidence of recurrent ulceration or a positive result from an insulin test with evidence of recurrent ulceration.

vagotomy for gastrojejunal ulcer after gastroenterostomy reported 18 months after surgery that he was well and had no symptoms of ulcer or evidence of disturbances of motility. However, the remaining patient in this series reported recurrent ulcer pain one year after vagotomy.

RESULTS IN CASES OF GASTROJEJUNAL ULCER AFTER GASTRIC RESECTION

Vagotomy Alone.—The transthoracic approach (table 5) was used in 31 of these cases, with excellent results in 20 (64.5%), unsatisfactory results in eight (25.8%), and poor results in three (9.7%). In two of the last three cases recurrences of ulcer were proved at operation eight months and two years, respectively, after the vagotomy. In one of these cases the result of the insulin test was positive, and in the other the test

TABLE 5.—*Results of Vagotomy in Cases of Gastrojejunal and Gastroduodenal Ulceration After Gastric Resection*

Operation	Approach	Time, Post-operative, Yr.	No.	Results: Excellent	Results: Unsatisfactory	Results: Poor	Symptoms of Ulcer: No	Symptoms of Ulcer: Yes
Gastrojejunal Ulcer								
Vagotomy alone	Thoracic	1	3	2	1	..	..	..
		2	9	7	1	1	..	..
		3	11	9	2	..	..	..
		4	6	2	2	2	..	..
		5	2	..	2	..	..	..
		Total	31	20 64.5%	8 25.8%	3 9.7%	27 87.1%	4 12.9%
	Abdominal	1	4	3	1	..	..	..
		2	5	3	2	..	..	..
		3	3	3	..	..	..	..
		4	4	2	1	1	..	..
		5	1	1	..	..	..	..
		Total	17	12 70.6%	4 23.5%	1 5.9%	15 88.2%	2 11.8%
Vagotomy and re-resection	Abdominal	1	2	1	1	..	..	..
		2	3	2	1	..	..	..
		Total	5	3 60%	2 40%	..	4 80%	1 20%
Gastroduodenal Ulcer								
Vagotomy alone	Abdominal	1-3	..	..	..	..	..	..
		4	1	1	..	..	..	..
		Total	1	1 100%	..	..	1 100%	0
Vagotomy and re-resection	Abdominal	2	2	1	1	..	..	..
		Total	2	1 50%	1 50%	..	1 50%	1 50%

was unsatisfactory. The recurrence of ulcer in the third patient was verified at roentgenologic examination three and a half years after vagotomy; the result of the insulin test in this case was negative. In 12 (70.6%) of the 17 cases in which the abdominal approach was used results were excellent, in four (23.5%) unsatisfactory, and in one (5.9%) poor. In this last case recurrence of the ulcer was proved at operation 42 months after vagotomy. The insulin test was not performed in this case. The results by years after vagotomy can be seen in table 5.

Vagotomy Plus a Second Gastric Resection.—Three patients who had vagotomy combined with a second resection of the stomach reported by questionnaire two years after this operation; two had excellent results and one an unsatisfactory result. This latter patient reported recurrent pain of ulcer. Two additional patients were examined one year postoperatively. The results were excellent in one of these and unsatisfactory in the other, owing to disturbances of motility.

RESULTS IN CASES OF GASTRODUODENAL ULCER AFTER BILLROTH I GASTRIC RESECTION

Three patients reported by questionnaire two to four years after vagotomy for gastroduodenal ulcer. In one case vagotomy alone was performed, and in two cases vagotomy was combined with a second gastric resection. In two cases excellent results were obtained. In one case in which a second gastric resection combined with vagotomy was performed severe recurrent ulcer pain developed two years after the operation.

RESULTS IN CASES OF GASTROJEJUNOCOLIC FISTULA

Vagotomy was performed in eight cases of gastrojejunocolic fistula. In seven of these cases other operations were carried out on the stomach and colon in association with vagotomy. These included, in various combinations, closure of fistula in six, gastric resection in two, taking down of the anastomosis in one, and exteriorization of the colon in one. Six of the eight patients reported excellent results one to five years after surgery. One patient reported recurrent ulcer pain two and a half years after vagotomy and gastric resection. One patient who had vagotomy and gastric resection was operated on less than a year before this study.

COMMENT ON RESULTS

The number of cases in which results are listed as excellent in tables 4 and 5 should be compared with the number of cases in which no symptoms of ulcer were found. From this comparison it is evident that, if our criteria for excellent results had consisted of the absence of symptoms of ulcer without any consideration of the absence of postoperative disturbance due to vagotomy or the asymptomatic ulcer, which was found to be present on roentgenograms, the percentage of patients reporting excellent results would have been much higher.

EVALUATION OF SURGICAL PROCEDURES

In evaluation of the effectiveness of a surgical procedure for gastrojejunal ulcer, the interval since the procedure was performed has an important place. Sufficient time must elapse between the operation and the evaluating study for the recurrences to develop. Allen and Welch [6] stated that a third of the gastrojejunal ulcers develop in the first year and an additional third in the second year after an operation. On the other hand, Priestley and Gibson [7] have shown that the average time is three and a half years after operation. As indicated in table 2, following patients 10 years after gastroenterostomy will uncover only 57.4% of the gastrojejunal ulcerations that are severe enough to warrant further operation. In contrast, following patients five years after gastric resection uncovered 82.5% of the gastrojejunal ulcers that required further operation. Thus, while five years appears to be an adequate follow-up time to uncover gastrojejunal ulcer after gastric resection, even 10 years is not adequate after gastroenterostomy. Thus any follow-up studies herein are significant for gastrojejunal ulcers after gastric resection but incomplete and preliminary for gastrojejunal ulcer after gastroenterostomy.

6. Allen, A. W., and Welch, C. E.: Gastric Resection for Duodenal Ulcer; Follow-Up Studies, Ann. Surg. **115**: 530 (April) 1942.

7. Priestley, J. T., and Gibson, R. H.: Gastrojejunal Ulcer; Clinical Features and Late Results, Arch. Surg. **56**: 625 (May) 1948.

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195

Priestley and Gibson [7] found that, of 35 patients followed 5 to 10 years after excision of a gastrojejunal ulcer after gastroenterostomy with closure of the openings in the stomach and jejunum, 85.7% had recurrence of ulcer symptoms, and 31.4% required further surgery. From the results in the five cases in our series, it does not appear that vagotomy adds much to this procedure.

Priestley and Gibson [7] made a similar 5 to 10-year follow-up study on 103 patients on whom gastric resection was performed for gastrojejunal ulcer after gastroenterostomy at a risk of 2.3%. Symptoms of recurrent ulcer developed in 12.6%, and further operative treatment was required in 5.8%. These results should be compared with the results of vagotomy alone for gastrojejunal ulcer after gastroenterostomy. In our study, we found that 12.8% of 34 patients had symptoms of ulcer, 2.9% required further operation, and 22.5% had persistent disturbances of motility one to five years after vagotomy. Gastric resection, therefore, appears to be the treatment of choice for this type of gastrojejunal ulcer.

Gastrojejunal ulceration after resection of at least 70% of the stomach always presents a most difficult therapeutic problem. Few patients have been traced after gastric re-resection for comparative purposes, but Priestley and Gibson [7] did find that, of 11 such patients followed 5 to 10 years, only six were free of symptoms of ulcer. In our series of patients followed one to five years after vagotomy alone, 12.5% had recurrent symptoms of ulcer, 8.3% had required further operation, and 25% had persistent disturbances of motility. Thus vagotomy appears to be a sounder procedure in the treatment of gastrojejunal ulcer after gastric resection of at least 70% of the stomach than further resection of the stomach.

In cases in which gastrojejunal ulcer occurs after less than half to two-thirds of the stomach has been removed, we have performed further gastric resection in addition to vagotomy in selected cases. An insufficient number of cases of this type were available in our study or in the literature for us to settle the question of the advisability of combining these two procedures.

In seven of the eight cases of gastrojejunocolic fistula in which vagotomy has been performed with or without the associated operative procedures described previously, the colonic fistula was closed. Interestingly enough, results one to five years after vagotomy have been excellent in six cases and poor in one case.

As judged by the clinical results, vagotomy by transthoracic or abdominal approaches differs little in effectiveness. If there is little doubt of the condition present and if additional procedures, such as excision of a perforating lesion or further gastric resection, are not considered possible or necessary, transthoracic vagotomy may be performed in cases of gastrojejunal ulcer after adequate gastric resection; yet it is not always possible to determine the amount of remaining stomach by roentgenologic examination after partial gastrectomy. That subdiaphragmatic division of the gastric vagus nerves can be carried out as completely as by supradiaphragmatic division has been stated by Dragstedt [8] and proved by the anatomic dissections in 111 cadavers by Walters and co-workers.[9]

SUMMARY

A study has been made of the clinical features in 118 cases of gastrojejunal ulcer and in four cases of gastroduodenal ulcer in which vagotomy has been performed with or without other procedures. The transthoracic route was employed in 54 and the transabdominal route in 68 cases. Clinical results as of Jan. 1, 1951, have been determined by reexamination and laboratory studies one to five years after vagotomy in 13 cases and from replies to questionnaires in 84. In 41 of the 97 cases in which follow-up data were available, gastrojejunal ulceration had occurred after gastroenterostomy and in 53 after gastric resection. Gastroduodenal ulcer occurred after Billroth I resection in three cases.

Symptoms of gastrojejunal ulcer that were severe enough to warrant further surgery had developed after gastroenterostomy in an average of 9.3 years and after gastric resection in an average of 3.3 years. Thus, in order to include most of the recurrences, follow-up periods should differ for the two types of gastrojejunal ulceration.

Only 9.2% of the 54 patients who had moderate or massive hemorrhage before vagotomy and were followed one to five years after vagotomy had further hemorrhage.

The preoperative roentgenologic diagnosis of gastrojejunal ulcer was found to be correct in 67.2% of cases in which the transabdominal approach was used at operation.

Gastric acidity was reduced below preoperative levels one to five years after vagotomy in 85.3% of cases in which vagotomy alone had been performed for gastrojejunal ulcer after gastroenterostomy and in all cases in which it had been performed for gastrojejunal ulceration after gastric resection.

Vagotomy alone reduced gastric motility immediately in 54.6% of cases of gastrojejunal ulcer after gastroenterostomy and 42.1% of cases of gastrojejunal ulcer after gastric resection. One to five years after vagotomy alone, however, motility was reduced or absent in only 16.7% of the cases of gastrojejunal ulcer after gastroenterostomy and in 8.3% of the cases of gastrojejunal ulcer after gastric resection.

The over-all correlation of results of insulin tests with clinical results was excellent in 75% of all cases studied. However, in the cases in which recurrence of ulcer was proved, correlation of the results of insulin tests with clinical results was very poor. This indicates that the insulin test is a poor index of recurrent ulceration.

Vagotomy alone has produced excellent results in one to five years in 61.7% of 34 cases of gastrojejunal ulcer after gastroenterostomy and in 66.7% of 48 cases of gastrojejunal ulcer after gastric resection.

If the absence of symptoms of ulcer had been the sole criterion of an excellent result, the percentage of patients reporting excellent results would have been much higher. In our series of patients on whom vagotomy alone was performed for gastrojejunal ulceration, 88.2% of those who previously had had gastroenteros-

8. Dragstedt, L. R.: Section of the Vagus Nerves to the Stomach in the Treatment of Gastro-Duodenal Ulcer, Minnesota Med. **29**: 597 (June) 1946.

9. Walters, W.; Bradley, W. F.; Neibling, H. A.; Small, J. T., and Wilson, J. W.: Gastric Neurectomy for Gastric and Duodenal Ulceration; an Anatomic and Clinical Study, Ann. Surg. **126**: 1 (July) 1947.

tomy and 87.5% of those who previously had had gastric resection were free of symptoms of ulcer.

One-year to five-year results were excellent in five cases of gastrojejunocolic fistula treated by vagotomy with or without closure of the openings in the colon; one patient reported recurrent ulcer pain in two and one-half years after operation. However, a larger series and longer follow-up periods are necessary before the effectiveness of vagotomy in the treatment of this condition can be evaluated. There is little evidence in our series that the results after transthoracic vagotomy differ from those after transabdominal vagotomy.

DIAGNOSIS AND TREATMENT OF ESOPHAGEAL DISEASES

Philip Thorek, M.D., Chicago

Tremendous strides have been made during the past decade in diagnosing and treating the various diseases that the esophagus is heir to. That such conditions are not rare, but are rather frequent, is evident by the voluminous literature that has accumulated recently on this subject. These diseases are of interest to the general practitioner and specialist alike, and it is with this thought in mind that the following discussion is presented.

ANATOMIC CONSIDERATIONS

Some points in the anatomy of the esophagus bear emphasis. It is well to remember that the esophagus per se is 10 in. (25.4 cm.) long, extending from the 6th cervical vertebra (cricoid cartilage level) to the 10th dorsal vertebra (esophageal hiatus level). The esophagologist, however, does not measure from the sixth cervical vertebra, but rather from the alveolar margin, which adds an additional 6 in. (15.24 cm.) to the actual length of the esophagus; thus he bases his report on a 16 in. (40.6 cm.) structure.

The esophagus has three normal curves, three physiological constrictions, and can be divided into three zones. Its three curves, or flexures, are placed in the following manner. In the neck the esophagus curves to the left; as it descends in the thorax, it curves to the right; and, as it approaches the esophageal hiatus, it curves again to the left. These flexures are of practical importance, since they may determine the proper side of approach. The three physiological constrictions are located (1) at the level of the cricoid cartilage (sixth cervical level), (2) at the arch of the aorta, and (3) at the esophageal hiatus. It is at these constrictions that the greatest amount of irritation takes place and the greater number of pathological lesions are observed. Most foreign bodies are impeded in their path downward at the first physiological constriction and are therefore found on a level with the sixth cervical vertebra. In locating a swallowed foreign body, it is all-important, therefore, to order a roentgenogram of the neck as well as of the chest.

The relation of the vagus nerves to the esophagus should be stressed, since these nerves may be involved or must be sacrificed in some esophageal procedures. Although much has been written recently regarding the anatomy of the vagi and although numerous patterns have been described, in the main it may be stated that the left vagus nerve passes along the anterior aspect of the esophagus, intimately hugs the food pipe, and is the smaller of the two vagi. The right vagus passes posteriorly, does not hug the esophagus, and is larger.

To know the boundaries of the so-called esophageal triangle is to make identification and isolation of the supradiaphragmatic portion of the esophagus a simple and rapid maneuver. This anatomic triangle is bounded in front by the heart, behind by the descending aorta, and below by the diaphragm.

Almost every text, monograph, or recent article calls attention to the poor blood supply of the esophagus. I cannot agree with this teaching. To emphasize this point one needs only to divide the esophagus into upper (cervical), middle (thoracic), and lower (abdominal) parts. The upper part of the organ is supplied voluminously by the inferior thyroid artery; the middle, or thoracic, part is supplied by aortic, bronchial, and intercostal branches; the lower part is well supplied by the left gastric and the inferior phrenic arteries. On removal of the entire thoracic esophagus, both supra-aortic and infra-aortic portions, from its mediastinal bed, brisk, bright red arterial oozing is noted when the esophagus is transected at its entrance into the stomach. I feel, therefore, that much more can be expected of the esophagus in its ability to heal, particularly if careful sutures are placed and if tension is avoided.

CONGENITAL DEFECTS

Much has been learned recently about congenital atresias and tracheoesophageal fistulas, so that now they can be properly classified and treated. Various combinations and degrees of these anomalies are possible. The commonest such defect is one in which the proximal end of the esophagus terminates as a blind pouch and the distal end joins the trachea to form a tracheoesophageal fistula.

Such a defect is to be suspected if the newborn baby shows a symptom complex revealing the three "C's," namely, coughing, choking, and cyanosis. Especially is this true if there is an abnormal amount of drooling and rhinorrhea. These symptoms should suggest an impending surgical emergency. The roentgenologist is of inestimable value in determining the type and site of such lesions by merely noting the presence or absence of gas in the stomach and bowel and by injecting a small amount of iodized oil (lipiodol*) through a nasal catheter into the proximal portion of the esophagus (barium should never be used).

Read before the Section on Diseases of the Chest at the One-Hundredth Annual Session of the American Medical Association, Atlantic City, June 15, 1951.

From the Departments of Surgery of the University of Illinois, Cook County Graduate School of Medicine, Cook County Hospital, American Hospital, and Alexian Brothers' Hospital.

The side of approach to atretic lesions and tracheoesophageal fistulas is open to controversy. It is true that, if only a small narrow atretic portion in the esophagus exists, the right-sided approach is preferable. The reasons for this are that the arch of the aorta does not interfere with exposure, only the azygos vein need be ligated and severed to visualize the esophagus thoroughly, and an end to end anastomosis may be accomplished readily. However, if the atresia or the fistula involves a longer segment of esophagus, an end-to-end esophageal anastomosis cannot be accomplished. Thus, if one has utilized a left-sided approach, it is simple to open the diaphragm, mobilize the stomach, and perform an intrathoracic esophagogastrostomy. It should be remembered also that in the newborn and in the young the aorta is not the barricading impediment that it is in older persons, since in the young it can readily be retracted out of the way.

If a few of these pertinent facts are kept in mind, not every "blue baby" will be thought to have the tetralogy of Fallot, and an immediate and proper work-up will be instituted, thus saving many such children from unnecessary death.

ESOPHAGEAL HIATUS HERNIA

This hernia is a type of diaphragmatic hernia in which the upper part of the stomach herniates through the esophageal hiatus. The following three types of esophageal hiatal hernias have been described: (1) the paraesophageal type, in which the stomach herniates through the esophageal hiatus and lies parallel with an esophagus of normal length; (2) the sliding type, in which the stomach is herniated through the hiatus but has pushed an esophagus of normal length upward, thus rendering it tortuous; and (3) the hiatal hernia with a congenitally short esophagus, in which the upper part of the stomach is herniated through the hiatus because the esophagus has never attained its normal length.

The last-mentioned type can be diagnosed by the esophagologist when he records the appearance of gastric mucosa at an unusually high level, indicating a short esophagus. Hiatal hernias may be observed as a coincidental finding in taking gastrointestinal roentgenograms. Although many advocate leaving them alone, the danger of strangulation of such a herniated segment of stomach, with resulting putrid empyema and rapid death, must be kept in mind. Phrenicotomy might be the operation of choice in the aged patient with diaphragmatic hernia (fig. 1). By means of this method, which relaxes the diaphragm, strangulation and gangrene of the herniated contents might be prevented.

At times this type of hernia is associated with congenital absence of the diaphragm, and in such cases much of the gastrointestinal tract, spleen, and even the kidney have been found in the thoracic cavity.

Many patients with hiatal hernias complain of epigastric distress, bloating, belching, anorexia, loss of weight, and retrosternal pain. Such patients have been diagnosed erroneously as having disease of the gallbladder, peptic ulcer, gastritis, or coronary disease. These errors can be avoided if the possibility of hiatal hernia is kept in mind and if roentgenograms are taken with the patient in the Trendelenburg position, which would readily demonstrate herniation that might otherwise be overlooked. Unexplained secondary anemia should always make one suspicious of an overlooked diaphragmatic hernia.

The surgical repair of a paraesophageal hernia or a sliding type of hernia is simple, since all that is necessary is reduction of the herniated stomach and tightening of the esophageal hiatus. It is the hernia associated with a congenitally short esophagus that presents a problem. For such a lesion I have devised a procedure by which the hiatus is incised and enlarged and the defect increased. This is accomplished by herniating more stomach into the thoracic cavity, thus removing the pull on the congenitally foreshortened esophagus. The esophageal hiatus is then loosely sutured around the stomach.

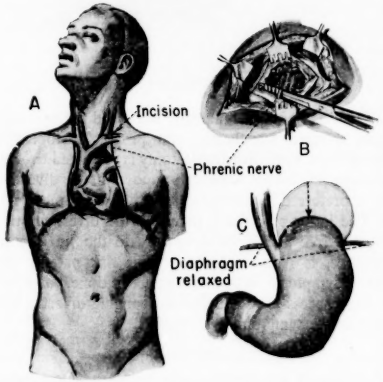

Fig. 1.—Phrenic avulsion for diaphragmatic hernia. *A*, the course of the phrenic nerve; *B*, avulsion of the nerve; *C*, relaxation of the left hemidiaphragm and reduction of the herniated stomach following phrenic nerve avulsion.

ESOPHAGEAL DIVERTICULA

The time-honored classification of diverticula into pulsion and traction types is still of value. The pulsion type of diverticulum occurs either in the neck (cervical) or immediately above the diaphragm (epiphrenic). The so-called traction type is usually located in the region of the tracheal bifurcation, where the chronically inflamed tracheal lymph nodes are found. These rarely produce symptoms, since they usually have a wide ostium that forms their neck. However, more important than the classification is appreciation of the pathological physiology that underlies the formation of this condition. It is believed that one of the prerequisites for the pulsion type is a weakness in the muscular wall, which permits herniation of the mucosa through the weak part and results in a diverticulum. No symptoms are produced as long as the opening into the diverticulum is large; however, as food slowly packs into the diverticulum, the latter increases in size and drops downward. This process con-

tinues until the weighted sac hangs downward and produces pressure on the esophagus, obstructing it. It should be noted that in such a far-advanced stage food has easier access to the diverticulum than to the esophageal lumen proper. Dysphagia is the outstanding complaint, and diverticulitis, perforation, and mediastinitis are the commoner complications.

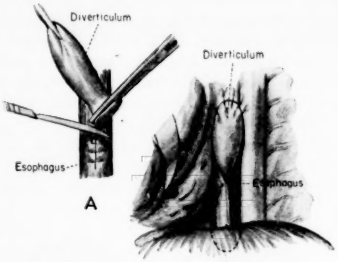

Fig. 2.—*A*, diverticulectomy and *B*, diverticulopexy.

In this day of chemotherapy, improved surgical technique, modern anesthesia, and proper postoperative care, the one stage diverticulectomy is preferred over the two stage procedure. Although removal of the diverticulum is preferred, diverticulopexy still has its place (fig. 2). The latter procedure, in which the diverticulum is dissected free and stitched upward to the surrounding structures, is reserved for the poor risk patient with marked symptoms. When this has been done, food does not have access to the downward-hanging diverticulum, and thus the symptoms are relieved.

PORTAL HYPERTENSION

A ruptured esophageal varix causes a true surgical emergency that taxes the diagnostic ability, skill, and judgment of the surgeon. This condition results from the increased pressure in the portal system and is almost always observed at the lower end of the esophagus (recent studies reveal, however, that varices may occur in any part of the esophagus). Portal hypertension may be due to intrahepatic or extrahepatic causes. The usual condition causing intrahepatic block is cirrhosis of the liver. Extrahepatic block may be due to phlebitis, thrombosis, fibrous stenosis, or cavernomatous transformation of the portal vein; it may be congenital or acquired.

One does not refer to Banti's disease in these modern times, but rather to Banti's syndrome. This is characterized by splenomegaly, anemia, esophageal varices, ascites, and leukopenia. The syndrome has been produced experimentally by Whipple, who blocked the portal vein. If the block is due to an intrahepatic lesion, the liver function tests will give positive results; whereas if the portal block is extrahepatic, the results of these tests are usually negative. If the condition is in a quiescent stage, it may be safe to take an esophagram, which will reveal the pathognomonic "beaded" appearance at the lower end of the esophagus.

Since hemorrhage from a ruptured esophageal varix may be fatal, definite measures must be taken to prevent recurrence. Some of the therapeutic procedures advocated are injection of the varix with sclerosing agents, tamponade with oxidized cellulose (oxycel®) or absorbable gelatin sponge (gelfoam®) through the esophagoscope, ligation of the coronary vein, esophagogastric resection to remove the "pile bearing" area, and various forms of portacaval shunts. Garlock has recently advocated mediastinal packing for such profuse hemorrhage.

Portacaval shunts have attained a certain degree of popularity in the past few years, and various types of anastomoses have been attempted in order to shunt the blood from the portal to the caval system. It is my opinion that, rather than the time-honored end-to-side portacaval shunt (Eck fistula), a lateral anastomosis between the portal vein and the inferior vena cava will prove to be the method of choice. This is accomplished best through a right thoracolaparotomy incision in which the costal arch is divided, making it possible to dislocate the right lobe of the liver into the right thoracic cavity. When this approach is used, the portal vein and the inferior vena cava practically approximate themselves, thus avoiding the necessity of dissecting out the common duct and the hepatic artery. It seems preferable also to permit some portal blood to continue through the liver, rather than make a complete division of the portal vein. Only time will tell the efficacy of these measures.

Recently Rienhoff has advocated ligation of the hepatic artery close to its point of origin as a palliative method of controlling the complications associated with portal hypertension (fig. 3).

CARDIOSPASM (ACHALASIA) OF ESOPHAGUS

Cardiospasm is a condition in which there is dilatation, hypertrophy, and tortuosity of the esophagus unassociated with an obstructed esophageal hiatus. Theories

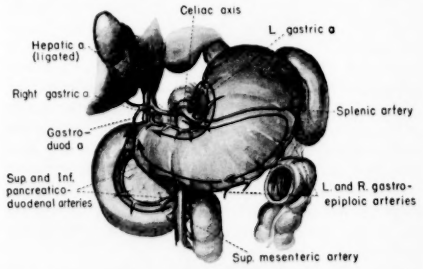

Fig. 3.—Ligation of the common hepatic artery for portal hypertension. The collateral circulation is indicated by arrows.

as to its production are numerous and will not be discussed here. This condition is twice as common in women as in men, and in a rather large percentage of patients a history of emotional strain or psychic trauma can be elicited.

This condition has been divided into types or stages. The early case shows a fusiform appearance; the mod-

erately advanced case, a flask-shaped appearance; and the far advanced case, the true sigmoid variety. The outstanding symptoms are dysphagia, regurgitation, and pain. Complete esophageal obstruction for varying periods has been noted, even to a point where the patient cannot swallow his own saliva. The pain is usually retrosternal and varies from mild to severe. Morphine addiction has resulted from this condition.

The roentgenogram is of particular help in diagnosing cardiospasm. Recently Kramer and Ingelfinger described the methacholine (mecholyl®) test as an aid to the diagnosis of cardiospasm. When methacholine, a parasympathomimetic drug, is injected into a normal person, there is only a slight increase in tone and magnitude of esophageal contractions; however, in patients with cardiospasm marked esophageal spasm and contractions follow administration of the drug. Complications that may be associated with the condition are bronchitis, bronchiectasis, and pulmonary abscess. All these may result from aspirated material regurgitated from the esophagus.

Medical management includes psychotherapy, antispasmodics, and dilatation. Only 10% of these patients require surgical treatment: in the remaining 90% the condition can be controlled by the other forms of therapy mentioned. Surgically, many types of procedures have been advised, which include cardioplasties, cardiomyotomies, resections, and anastomoses.

148
52

CARCINOMA OF ESOPHAGUS

No longer is a defeatist attitude assumed in cases of carcinoma of the esophagus. What was considered a hopeless and inoperable condition only a decade ago presents at least a worth-while challenge to the surgeon of today. If present impressions are correct, the over-all outlook and prognosis for the patient with carcinoma of the esophagus is better than the 5%, five year "cure" prognosis for patients with carcinoma of the stomach.

It is of practical value to divide the esophagus into zones. Many such divisions have been described. One that has served me well divides the organ into three zones, namely, an upper (zone 1), which extends from the beginning of the cervical esophagus to the manubrium sterni; a middle (zone 2), which extends from the manubrium sterni to the inferior pulmonary ligament; and a lower (zone 3), which extends from the inferior pulmonary ligament to the esophagogastric junction.

Early diagnosis is of paramount importance in cases of this type of carcinoma, since it is by this means that the survival rate can be increased. One often hears mention of a "change in stool habit" as a probable symptom of carcinoma in the lower intestinal tract; in like manner it may be stated that any persistent change in the swallowing habit is an indication of carcinoma of the esophagus, until proved otherwise. Were this dictum to be heeded and such cases further investigated by means of esophagoscopic and roentgen study, many esophageal neoplasms would be operated on earlier.

TREATMENT

Needless to say, preoperative and postoperative therapy for these patients is of the utmost importance, and much has already been written concerning these phases. For lesions located in zone 1 the Wookey procedure [1] has been used, especially for a tumor situated in the cervical portion of the esophagus. Recently, however, lesions involving the superior mediastinal segment of the esophagus as well as the cervical part have been approached by a more radical procedure, which removes the thoracic portion of the esophagus and most of the cervical portion. This is accomplished through a thoracic phase of the operation and a cervical phase. The operation is completed by an intracervical end-to-side esophagogastrostomy. In placing the mobilized stomach in the neck, the surgeon may find that the thoracic inlet impinges on the stomach. If this is the case, it may be necessary to remove the inner half of the clavicle and the first rib. Whether the mobilized stomach should be placed behind or in front of the arch of the aorta is a moot question and must be decided on by the surgeon at the time of operation.

Lesions of zone 2, or those which involve most of the thoracic portion of the esophagus, are removed by a rather standardized procedure, in which a wide esophageal resection is accomplished, followed by an end-to-side supra-aortic esophagogastrostomy or esophagojejunostomy. When the jejunum is used, it may be necessary to do a Roux Y-anastomosis or some modification thereof.

Lesions of zone 3 include not only the lower end of the esophagus but the gastric cardia as well. I prefer a thoracolaparotomy incision, in which a left rectus incision extends across the left costal arch, dividing it and then continuing into the eighth intercostal interspace. The diaphragm is divided to and through the esophageal hiatus, and the esophagus is mobilized from the aortic arch to its entrance into the stomach; the latter is then mobilized to the pylorus. The right gastric and gastroepiploic arteries should be left intact. An esophagogastric resection is then accomplished and is followed by an end-to-side esophagogastrostomy. If necessary, the spleen and part of the pancreas are removed.

In most of my esophageal operations water seal drainage is preferred, and a Levine intragastric tube is permitted to remain in place for the first three postoperative days. I cannot subscribe to the teaching that these tubes may be harmful. Routine portable roentgenograms are taken 24 hours after operation to determine the pulmonary status.

PALLIATIVE PROCEDURES

Although the primary lesion may be extensive or may even show distant metastases, it is always worthwhile to attempt a palliative resection, thereby improving the patient's general condition and sense of well being. This is explained by the fact that infection is reduced and anemia is corrected. In the event that it is impossible to remove the primary growth, some short circuiting procedure, such as an esophagogastrostomy or an esophagojejunostomy, may make the patient's remaining days more comfortable.

1. In the Wookey procedure a skin flap is made from the skin of the neck. This is placed under the mobilized cervical portion of the esophagus and tumor. Some days later the tumor and adjoining esophagus are removed, and the esophageal defect is bridged by the tube formed from the previously made flap.

RUPTURE OF ESOPHAGUS

Both spontaneous and traumatic rupture of the esophagus have been described in the literature. A spontaneous rupture is an interesting lesion and is not so extremely rare as it was formerly thought to be. If one has the condition in mind, it should be possible to diagnose it preoperatively. It is found most frequently in male patients who are victims of alcoholism and is associated with a preliminary severe bout of vomiting; this is followed by agonizing pain, which may be either thoracic or abdominal. The patient usually goes into rapid and profound shock. This condition cannot be confused with a ruptured peptic (gastric or duodenal) ulcer, since with the ruptured ulcer the pain appears first and is followed by vomiting; whereas with the spontaneous rupture, vomiting comes first and is followed by pain. The ruptured esophagus is associated frequently with surgical emphysema, which can be felt in the neck. Whenever such emphysema is noted, one should think immediately of spontaneous esophageal perforation and verify this with a flat roentgenogram, which will reveal a spontaneous hydropneumothorax. Aspiration of the chest has been done in some cases, resulting in the discovery of food particles or vomitus. Formerly the mortality was thought to be 100%; however, with early diagnosis and modern surgical therapy the outlook is much better today, and some patients are definitely being saved.

MEDIASTINITIS

Perforation of the esophagus may result in a serious condition—mediastinitis. Malignant tumors or foreign bodies are the two main causes of perforation. Since carcinoma develops gradually, it does not give rise to as extensive an infection of the mediastinum as do other lesions.

Perforations caused by foreign bodies are of more practical importance. At present it is felt that mediastinal infections that extend deeper than the fourth or the fifth thoracic vertebra cannot be adequately drained by means of cervical mediastinotomy and must be treated by posterior mediastinotomy. Chemotherapy is an all-important adjunct for this type of infection.

BENIGN TUMORS

Benign tumors of many types have been found in the esophagus, the commonest of which are lipomas and myomas. Owing to the constant effect of swallowing, such tumors have a tendency to become tremendously elongated and pedunculated. They have been known to be coughed up and to appear in the patient's mouth. If this occurs, it may be possible to remove the lesion by means of a snare passed orally. If the tumor, however, is lower down, esophagotomy with removal of the tumor and primary closure of the esophagus is the treatment of choice.

ESOPHAGITIS

The important subject of esophagitis is coming into its own today; this is probably one of the most overlooked clinical entities. Numerous editorials and articles on this subject are appearing in current literature, and its importance is being stressed. It is suspected in cases associated with heartburn, retrosternal pain, dysphagia, peptic ulceration, mediastinitis, dilatation of the esophagus, and perforation with putrid empyema. The esophagologist can usually make a definite diagnosis if the condition is only suspected. The treatment is both medical and surgical.

In the far-advanced case with marked cicatricial stenosis and almost complete obstruction, the surgical treatment taxes the experience and skill of the surgeon. In a patient recently operated on by me it was necessary to create a temporary esophageal fistula over a T-tube to overcome the stenosis and permit healing.

It is impossible to mention in this paper every aspect of esophageal pathology. Only the commoner and more frequent conditions have been stressed. The esophagus has been just as much a "hermit" as the pancreas; however, recently it has been brought within reach of the well-equipped and well-trained general practitioner and specialist alike. That this organ is accessible to modern diagnostic and therapeutic procedures is due to the efforts of such men as Franz Torek, Sauerbruch, Garlock, Sweet, Nissen, and others too numerous to mention. Their contributions have enabled the modern surgeon to save many lives that were doomed a decade ago. Today the future for esophageal therapy is most promising.

SUMMARY

The commoner pathological conditions that affect the esophagus have been discussed, and their treatments have been evaluated. The importance of physiopathology as an aid to early diagnosis has been stressed. The advent of improved diagnostic methods, modern anesthesiology, chemotherapy, skillful surgical technique, and proper preoperative and postoperative care has brought the esophagus into the realm of therapeutic safety.

25 E. Washington St.

Evaluation of Antacids.—Calcium carbonate appears to be the most effective of the many antacids in current use. In hourly doses of 2 or 4 gm., together with milk and cream and atropine, 1.0 mg. two to four times daily, calcium carbonate usually maintains the pH of the gastric contents between 4.0 to 5.5 in patients with duodenal ulcer; it does not cause alkalosis, as has been assumed, and its constipating effect can be corrected with proper substitution of laxative antacids. This regimen, however, is effective only during the period of administration; it does not control the excessive nocturnal gastric secretion of duodenal ulcer. The continuous intragastric drip is perhaps more effective for this purpose, but its applicability is limited. Aluminum hydroxide, magnesium trisilicate or tribasic calcium phosphate in large quantities diminish but do not completely eliminate the free acidity; their neutralizing effect is much less or nil when administered at long intervals and in small amounts, as is the custom of some clinicians. . . . The antacid efficiency of sodium carboxymethylcellulose in man remains to be determined. Protein hydrolysates are less effective than calcium carbonate even when administered in large amounts, and they provoke a secondary rise in secretion exceeding original levels. The neutralizing capacity of available resins in vivo is not impressive. Detergents such as sodium alkyl sulfate do not alter the pH of the gastric contents, and their antipeptic action in man is insignificant. Mucin has little neutralizing value.—Joseph B. Kirsner, M.D., Walter L. Palmer, M.D., Erwin Levin, M.D., and Arthur P. Klotz, M.D., Gastric Antacid and Anti-Secretory Drugs: A Survey Based Primarily on Their Effects Upon Gastric Secretion In Man, *Annals of Internal Medicine*, October, 1951.

VALUE OF CARDIAC FUNCTION TESTS IN INDUSTRY

Leon Pordy, M.D., Arthur M. Master, M.D.
and
Kenneth Chesky, M.D., New York

Since the diagnosis of heart disease and the evaluation of cardiac function cannot always be made by the routine clinical methods, dependable functional tests of the heart are definitely necessary. Cardiovascular disease is the leading cause of death in the country today. This is, of course, related to the increasing numbers of aged in our population. In modern industrial plants especially, therefore, is the need for accurate diagnostic and functional tests of the heart now most apparent—including tests of laborers, white collar workers, and executives. The continuing partial disability of workingmen with angina pectoris due to coronary disease, chronic congestive heart failure, or even cardiac neurosis is much more important than is the occasional dramatic attack of acute coronary occlusion or insufficiency among apparently healthy airplane pilots while in flight.

From the standpoint of the nation's needs, the physician in industry must assume the responsibility for ferreting out previously undetected cardiac disease from among the employees or executives of his concern. Executives, especially, are generally considered to be likely victims of unsuspected coronary artery disease and of death due to this cause. From a purely economic standpoint, furthermore, functional tests are needed for evaluating and processing disability claims in life insurance and workmen's compensation cases and for determining the time for retirement of the increasing numbers of aged employees. Cardiac function tests, therefore, are today at least as vital in industrial medicine as they have been in the past in private practice.

The following four cardiac function tests will be discussed: (1) the "2-step" exercise electrocardiogram, (2) the anoxemia (10% oxygen) test, (3) the ballistocardiogram, and (4) the Krasno-Ivy nitroglycerin flicker test. The technique, safety, and diagnostic value of these tests will be considered in detail.

"2-STEP" EXERCISE ELECTROCARDIOGRAM

In 25 to 37% of the patients with coronary artery disease, the results of all routine investigations—physical examination, cardiac fluoroscopy, teleroentgenogram of the chest, and 12 lead, resting electrocardiogram—may be normal.[1] There is, therefore, an increasing trend toward the use of stress tests of the heart, in order to obtain some possible objective evidence of the presence of organic heart disease.

In 1929 the "2-step" exercise procedure was devised by Enid T. Oppenheimer and Master [2] as a practical test of circulatory fitness. After thousands of trials, tables were formulated that prescribed the standard number of trips patients should make, depending on their age, sex, and weight. The tables were at first based on the response of the blood pressure and pulse to exercise. Later, electrocardiographic changes following standard exercise were used as the test for coronary insufficiency.[3]

Method.—The "2-step" test is performed on a patient only if the usual 12 lead, resting electrocardiogram is normal. The patient climbs the "2-step" stairs (each step is 9 in. [22.9 cm.] high) with the four electrodes left in place (fig. 1). Standard leads 1, 2, and 3 and a precordial lead, V_4 or V_5 (with the tallest, widest R wave), are taken routinely. In the standard or single test, the required number of ascents for each patient (complete trips over the steps in one direction) is determined from table 1 or 2; the test is performed in one and one-half minutes. After the exercise is completed, the patient returns to his original resting position, sitting or recumbent, and the electrocardiogram is taken immediately,

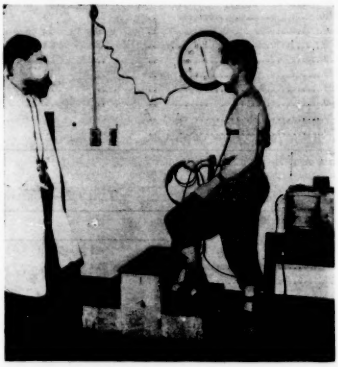

Fig. 1.—Patient, with electrodes attached, about to perform "2-step" exercise test.

two minutes and six minutes later. Dizziness may be avoided by having the patient change his direction after the completion of every trip, i. e., turning toward the examiner each time. If the single test is normal, the double "2-step" test is performed, at least one hour later. This consists of making twice the number of standard trips in three minutes. One-third of the patients with abnormal double tests had normal single tests; the single "2-step" test is performed first, for obvious reasons of safety.

From the Cardiographic Department of the Mount Sinai Hospital.

Read before the Section on Preventive and Industrial Medicine and Public Health at the One-Hundredth Annual Session of the American Medical Association, Atlantic City, June 14, 1951.

1. White, P. D.: Heart Disease, New York, The Macmillan Company, 1944, ed. 3, p. 827. Master, A. M.: The Two-Step Exercise Electrocardiogram: Test for Coronary Insufficiency, Ann. Int. Med. **32**: 842, 1950.

2. Master, A. M., and Oppenheimer, E. T.: Simple Exercise Tolerance Test for Circulatory Efficiency with Standard Tables for Normal Individuals, Am. J. M. Sc. **177**: 223, 1929.

3. Master, A. M.; Friedman, R., and Dack, S.: The Electrocardiogram After Standard Exercise as a Functional Test of the Heart, Am. Heart J. **24**: 777, 1942.

Criteria for abnormal "2-step" tests include: (1) RS-T segment depression (greater than ½ mm.) below the isoelectric (P-R) level; (2) partial or complete inversion of a T-wave (except in lead 3); (3) transient arrhythmias, conduction defects, or large Q-waves. These changes are similar to those found during spontaneous episodes of angina pectoris. The precordial leads were found to be the most sensitive (V_4 or V_5). If the alterations persist for longer than six minutes, the tracings are repeated until the record returns to normal. It is not the purpose of this objective test to induce chest pain; the appearance of electrocardiographic alterations is, moreover, independent of the occurrence of pain or pressure. The test should not be performed within one hour after a meal or other exercise. Smoking and drugs, such as digitalis and nitroglycerin, have an influence on the result of the test. Cardiac enlargement or heart failure are definite contraindications to it.

The "2-step" test is simple, safe, standardized, and employs climbing, a form of exercise to which every patient is accustomed. The RS-T segment and T-wave alterations in abnormal tests are related to transient anoxia and ischemia of the subendocardial layer of the myocardium, owing to acute coronary insufficiency, induced by the exercise. The safety of the "2-step" exercise electrocardiogram test is proved by the absence of untoward reactions in thousands of patients tested—the customary precautions and standardized technique being used.

Follow-Up Studies.—A follow-up study from one to five years' duration, of 200 cases is reported (100 cases with abnormal "2-step" exercise electrocardiograms and 100 with normal exercise electrocardiograms) in order to prove the practical value of this procedure.

Cases with Normal Tests: In the group of 100 consecutive cases with normal tests, there were 83 men and 17 women, ranging in age from 21 to 71 years. The follow-up studies extended over a period of five years; the majority were studied for at least two years. The largest number of patients (41) were in the 40 to 49 year age group. Sixty-eight of the 83 men were employed —39 were professional people or executives, 25 were white collar workers, and 4 were laborers. Of the 17 women, 14 were housewives, and 3 were gainfully em-

TABLE 1.—*Standard Number of Ascents for Males**

Weight (Lb.)	Age in Years												
	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
40- 49	35	36	..	..	..	..	..	..	..	..	..	..	..
50- 59	33	35	32	..	..	..	..	..	..	..	..	..	..
60- 69	31	33	31	..	..	..	..	..	..	..	..	..	..
70- 79	28	32	30	..	..	..	..	..	..	..	..	..	..
80- 89	26	30	29	29	29	28	27	27	26	25	25	24	23
90- 99	24	29	28	28	28	27	27	26	25	25	24	23	22
100-109	22	27	27	28	28	27	26	25	25	24	23	22	22
110-119	20	26	26	27	27	26	25	25	24	23	23	22	21
120-129	18	24	25	26	27	26	25	24	23	23	22	21	20
130-139	16	23	24	25	26	25	24	23	23	22	21	20	20
140-149	..	21	23	24	25	24	24	23	22	21	20	20	19
150-159	..	20	22	24	25	24	23	22	21	20	20	19	18
160-169	..	18	21	23	24	23	22	22	21	20	19	18	18
170-179	..	..	20	22	23	23	22	21	20	19	18	18	17
180-189	..	..	19	21	23	22	21	20	19	19	18	17	16
190-199	..	..	18	20	22	21	21	20	19	18	17	16	15
200-209	..	..	..	19	21	21	20	19	18	17	16	16	15
210-219	..	..	..	18	21	20	19	18	17	17	16	15	14
220-229	..	..	..	17	20	20	19	18	17	16	15	14	13

* From Am. Heart J. **10**: 497, 1935.

TABLE 2.—*Standard Number of Ascents for Females**

Weight (Lb.)	Age in Years												
	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
40- 49	35	35	33	..	..	..	..	..	..	..	..	..	..
50- 59	33	33	32	..	..	..	..	..	..	..	..	..	..
60- 69	31	32	30	..	..	..	..	..	..	..	..	..	..
70- 79	28	30	29	..	..	..	..	..	..	..	..	..	..
80- 89	26	28	28	28	28	27	26	24	23	22	21	21	20
90- 99	24	27	26	27	26	25	24	23	22	22	21	20	19
100-109	22	25	25	26	26	25	24	23	22	21	20	19	18
110-119	20	23	23	25	25	24	23	22	21	20	19	18	18
120-129	18	22	22	24	24	23	22	21	20	19	19	18	17
130-139	16	20	20	23	23	22	21	20	19	19	18	17	16
140-149	..	18	19	22	22	21	20	19	19	18	17	16	16
150-159	..	17	17	21	20	20	19	19	18	17	16	16	15
160-169	..	15	16	20	19	19	18	18	17	16	16	15	14
170-179	..	13	14	19	18	18	17	17	16	16	15	14	13
180-189	..	..	13	18	17	17	17	16	16	15	14	14	13
190-199	..	..	12	17	16	16	16	15	15	14	13	13	12
200-209	..	..	..	16	15	15	15	14	14	13	13	12	11
210-219	..	..	..	15	14	14	14	13	13	13	12	11	11
220-229	..	..	..	14	13	13	13	13	12	12	11	11	10

* From Am. Heart J. **10**: 497, 1935.

ployed. The chief presenting symptoms were chest pain or pressure in 62, hypertension in 13, and arrhythmias in 8; 8 others had miscellaneous symptoms. The remaining nine were asymptomatic and came for routine examination.

The follow-up study of this group of patients confirmed the belief that the presence of coronary insufficiency could practically be excluded, if both the single and double "2-step" tests were normal. All of these 100 patients are alive today. In only one instance did a coronary episode occur after the exercise tests had been found to be normal. This was in a woman in whom acute coronary occlusion developed three years after the initial test. Among hundreds of other patients also observed, spontaneous coronary disease episodes very rarely occurred within one year following normal tests. Thus, the diagnostic and prognostic value of normal "2-step" exercise electrocardiograms is established. This

TABLE 3.—*Normal Single and Double "2-Step" Tests (One Hundred Consecutive Cases)*

Final Diagnosis	Men	Women	Total
Normal	3	2	5
Functional	50	6	56
Hypertension	25	4	29
Previous coronary occlusion	4	2	6
Later coronary occlusion	0	1*	1
Rheumatic heart disease	1	2	3
Total	83	17	100

* Three years later.

TABLE 4.—*Normal Single and Double "2-Step" Tests (Sixty-Two Cases of Chest Pain or Pressure)*

Associated Diagnosis	Men	Women	Total
Gallbladder	4	1	5
Arthritis	7	2	9
Hiatus hernia	3	1	4
Ulcer	2	0	2
None	35	7	42
Total	51	11	62

is in sharp contrast to the other commonly employed tests for coronary insufficiency, e. g., the anoxemia test (see below), in which only abnormal tests are of diagnostic importance.

The final diagnoses in this normal group are listed in table 3. Sixty-one patients were found to be normal, or to have some functional heart disturbance. Six patients had had a previous coronary occlusion; their excellent clinical recovery was confirmed by the normal exercise electrocardiogram and by later follow-up studies. Since normal "2-step" tests practically exclude coronary insufficiency, further studies were undertaken of the 62 patients with normal tests having undiagnosed chest pain. In approximately one-third of these, gallbladder disease, arthritis, hiatus hernia, and peptic ulcer were discovered to be the underlying cause for the symptoms (see table 4). Thus, B. D., a white woman, 63, gave a history of recent severe, though atypical, chest pain. All the cardiac findings were normal, including a single and double "2-step" test (fig. 2). Further investigation revealed a far-advanced spondylitis, with marked lipping and bridging of the thoracic vertebrae, to be the underlying disease (fig. 3). A three-year follow-up study of this patient has revealed no cardiac episode. Such cases further confirm the diagnostic and prognostic value of normal "2-step" tests.

Cases with Abnormal Tests: Abnormal "2-step" exercise electrocardiograms, single or double, are definite evidence of the presence of coronary insufficiency. They may, at first, be the only objective finding in many

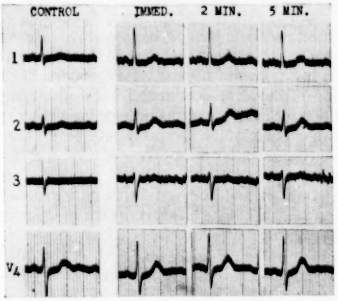

Fig. 2.—Double "2-step" test of B. D., a white woman, 63, with a typical severe chest pain. Control resting electrocardiogram and double "2-step" test is normal. Spondylitis was found to be cause of patient's symptoms.

cases of angina pectoris. Abnormal electrocardiographic findings after exercise, however, are not specific for coronary artery disease; rheumatic, syphilitic, or congenital heart disease or severe anemia may be the underlying organic condition. Moreover, the "2-step" test is abnor-

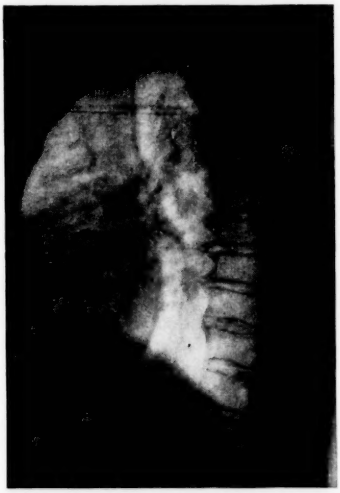

Fig. 3.—Same patient as in figure 2. Lateral chest roentgenogram revealing evidence of marked spondylitis.

mal in approximately 6 to 8% of normal persons. Patients with anxiety states or neurocirculatory asthenia may, likewise, have abnormal exercise tests. Thus, the insufficiency may be on a purely functional rather than organic basis. Unless this is borne in mind, numerous

patients may erroneously be labeled "cardiacs" and unnecessarily be limited in activity for the remainder of their lives. The differentiation between the functional and organic can usually be made on clinical grounds alone. In the hope of finding a further means of differentiating between the two, however, we have used dihydroergocornine (DHO-180), a "sympatholytic" agent.[4] In most patients with functional heart disturbances, this drug prevents the appearance of electrocardiographic abnormalities after the "2-step" test. Moreover, in most patients in whom the "2-step" test remained abnormal after use of dihydroergocornine, follow-up studies revealed definite evidence of the presence of coronary disease. Ergotamine, which had previously been used as an aid in this differential diagnosis, has been found to be too dangerous.

The group of 100 consecutive cases with abnormal single or double "2-step" tests consisted of 71 men and 29 women, ranging in age from 25 to 71 years. The largest number of patients (44) were in the 50 to 59 year age group. The follow-up studies extended over a period from six months to four years; most of the patients were reexamined at intervals for at least two years after the initial "2-step" test had been done. Sixty-one of the 71 men were employed—35 were professional persons or executives, 15 were white collar workers, and 11 were laborers. Twenty-four of the 29 women were housewives, and the remainder were paid workers. The chief presenting symptoms were chest pain or pressure in 76, hypertension in 8, arrhythmias in 9, and miscellaneous complaints in the remainder.

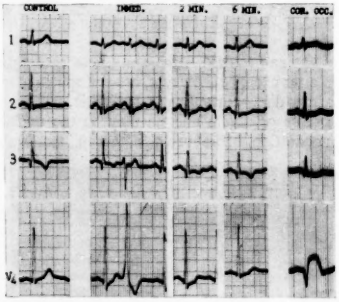

Fig. 4.—Single "2-step" test of S. N., a white man, 38, with angina pectoris unrelated to effort for three months. Control resting electrocardiogram is normal. Single "2-step" test is abnormal, with RS-T segment depressions in leads V_4 and 2 and ventricular premature beats after exercise. Three weeks later acute anterior infarction developed.

The results of the follow-up study in this group are listed in table 5. In 50 of the patients there had been definite electrocardiographic evidence of previous coronary episodes, either occlusion or insufficiency. All these patients had normal resting electrocardiograms at the time of their initial abnormal "2-step" test, though several displayed Q-waves of previous myocardial infarction. However, no RS-T segment deviations or T-wave inversions were seen in their resting electrocardiograms. In 14 of this group additional coronary attacks occurred.

The remaining 50 patients had had no previous spontaneous coronary episodes but had abnormal "2-step" tests. Twenty-one of these subsequently suffered from coronary occlusion or insufficiency—e. g., S. N., a 38-year-old white man, a dark, nervous gypsy (fig. 4), complained of severe heaviness across the chest for the preceding three months (in 1949). The chest pressure was unrelated to effort. Physical examination, chest roentgenogram and fluoroscopy, and a 12 lead, resting electrocardiogram revealed no abnormalities. The single "2-step" test was abnormal, showing ventricular premature beats and RS-T depressions in leads V_4 and 2. Three weeks after the "2-step" test had been made, an acute coronary occlusion with anterior wall infarction developed. After this episode the patient made a slow recovery. Although he still suffers from a severe anginal syndrome (relieved by use of nitroglycerin), the resting electrocardiogram is again within normal limits. However, the "2-step" test is abnormal whenever essayed.

Thus, in 71 of 100 cases with abnormal single or double "2-step" tests, the follow-up investigation has revealed evidence of organic coronary artery disease. In seven of these cases the patient has died as a result of coronary episode. The group of 29 cases of as yet unconfirmed coronary disease include only a very few cases in which the clinical diagnosis was neurogenic or functional coronary insufficiency. The follow-up study of these 200 cases, with normal and abnormal "2-step" tests, is further evidence of the value of the exercise electrocardiogram as a functional test of the heart.

TABLE 5.—*Abnormal Single or Double "2-Step" Tests (One Hundred Consecutive Cases)*

Final Diagnosis	Men	Women	Total
Previous coronary occlusion	11	2	13
Later coronary occlusion	4	1	5
Previous coronary insufficiency	27	10	37
Later coronary insufficiency	12	4	16
Coronary disease (undetermined)	17	12	29
Total	71	29	100

ANOXEMIA (10 PER CENT OXYGEN) TEST

For four years we had performed the anoxemia (10% oxygen) test routinely for the purpose of critically evaluating it. We have compared the results of over 300 anoxemia tests with those of the single and double "2-step" tests in the same persons.

Method.—The following description of the anoxemia test is given by Levy.[5] The resting electrocardiogram is recorded after the patient has been at bed rest for at least 30 minutes. As in the "2-step" test, the three standard limb leads and one precordial lead are used routinely. After the control record is taken, the patient breathes from a tank containing a mixture of 10% oxygen and 90% nitrogen. The mixture is passed through a water bottle before it reaches the patient. A flutter valve arrangement prevents rebreathing. The patient usually inhales the mixture for a period of 20 minutes; a tank of 100% oxygen is then substituted for the one with the low oxygen mixture for one minute or longer. The procedure may be stopped earlier if the test is abnormal

4. Pordy, L.; Arai, H. S., and Master, A. M.: Dihydroergocornine in Differential Diagnosis of Functional Heart Disturbances and Organic Heart Disease, J. Mt. Sinai Hosp. **17**: 26, 1950.

5. Levy, R. L.: Clinical Aspects of Coronary Insufficiency, Am. J. Med. **4**: 89, 1948.

or if chest pain, pressure, or a severe reaction should occur. Electrocardiographic tracings are taken 10 and 20 minutes after the test is begun.

We have modified the procedure, as described above, to some degree. Instead of the precordial lead 4F, we have substituted lead V_4. The control record is repeated after the application of the mask, since a resultant fear and fright may produce pronounced electrocardiographic alterations.[6] If the tracing is then still normal, the test is begun. Electrocardiograms are taken at 5 minute intervals during the 20 minute period of breathing 10% oxygen. A direct writing electrocardiogram machine has been found invaluable, since with it the procedure may be stopped as soon as the test is found to be abnormal.

Criteria for an abnormal anoxemia test include: 1. The arithmetic sum of the RS-T segment deviations in all four leads (1, 2, 3, and 4F) must be greater by 3 mm. or more than that of the control record. 2. There must be partial or complete reversal in the direction of the T-wave in lead 1, accompanied by an RS-T deviation of 1 mm. or more in this lead. 3. There must be complete reversal in direction of the T-wave in lead 4F, regardless of any RS-T deviation in this lead.

Contraindications to the test are an abnormal control electrocardiogram, congestive heart failure, or recent myocardial infarction (within the preceding four months). According to Levy,[5] the test should not be repeated within 24 hours.

Of 300 consecutive patients tested by us, not one showed an abnormal anoxemia test when both the single and double "2-step" tests were normal. On the other hand, we have found the anoxemia test to be abnormal in only 20 to 30% of patients with definite coronary artery disease and abnormal "2-step" tests, though it has been reported to be abnormal in approximately 50% of patients with organic heart disease.[7] The failure of the 10% oxygen test to be abnormal in the presence of coronary artery disease may be explained by the severity of the criteria as well as by the variability of the oxygen saturation of the blood during the procedure. Because of the latter, Malmström [8] has introduced a modified hypoxia test, utilizing a mixture of 6.5% oxygen, 4.5% carbon dioxide, and 89% nitrogen.

The anoxemia test was performed in 38 of the 100 patients with abnormal "2-step" tests mentioned above. Ten anoxemia tests were abnormal in this group (26%), 23 were normal, and 5 were borderline. The frequency of a normal anoxemia test in the presence of definite coronary artery disease is illustrated by the following case.

S. I., a white man, 38, gave a one year history of severe, typical angina pectoris. Although the electrocardiogram at rest was normal, "2-step" tests were repeatedly abnormal, with an RS-T segment depression of as much as 3 to 4 mm. and marked T-wave inversions. Tracings taken during spontaneous anginal seizures disclosed similar alterations. The anoxemia test, however, was normal (fig. 5). Transient electrocardiographic alterations, recorded five minutes after breathing 10% oxygen, were insufficient to meet the necessary criteria, and later tracings were all normal. A second anoxemia test, done some time later, was also normal. A follow-up study of this patient revealed a "status anginosus," which was unrelieved by left cervicodorsal sympathectomy. On numerous occasions the patient has had prolonged attacks of acute coronary insufficiency, with characteristic electrocardiographic abnormalities.

It is accepted that normal anoxemia tests do not rule out the presence of organic heart disease. On the other hand, it is claimed that abnormal anoxemia tests are of definite diagnostic significance. However, the value of this procedure is limited not only by the relatively low percentage of abnormal results in patients with organic heart disease, but also by the definitely abnormal results in patients with neurocirculatory asthenia and anxiety states, despite the stringent criteria. Thus, of the 10 abnormal anoxemia tests in the group of 38 described above, 2 occurred with psychoneurotic patients with functional heart disturbance. One of these cases has been reported in detail previously.[6]

The danger of the 10% oxygen test also should not be minimized. Even when the tests are normal, circulatory collapse, shock, and convulsions may appear suddenly. The incidence of such reactions was 2% in our series of 300 cases. Usually the immediate administration of 100% oxygen results in prompt recovery. In cardiac patients, however, such reactions are serious, and death has occurred during the procedure.[5]

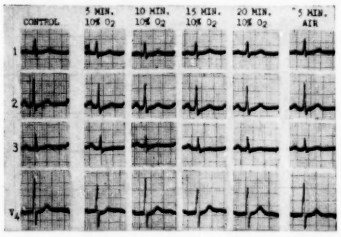

Fig. 5.—Anoxemia test of S. I., a 38 year old man with severe angina pectoris for one year. Control electrocardiogram is normal. Similar changes occurred with spontaneous anginal attacks as with abnormal "2-step" tests. Anoxemia (10% oxygen) test is normal.

In summary, the anoxemia (10% oxygen) test is not recommended as a routine cardiac function test in industry because of its relatively limited diagnostic value and inherent danger.

BALLISTOCARDIOGRAM

The ballistocardiograph became available as a practical cardiac function test apparatus in 1949 with the introduction of the direct body recording technique by Dock and Taubman.[9] The instrument records the motion of the body induced by the contraction of the heart and the surge of blood into the arterial tree during each cardiac cycle. We have investigated the value of ballistocardiography in more than 600 patients during the past year, using a modified Dock type photo cell apparatus.[10]

6. Master, A. M.; Pordy, L., and Kolker, J.: Ergotamine Tartrate and "Two-Step" Exercise Electrocardiogram in Functional Cardiac Disturbance, J. Mt. Sinai Hosp. **15**: 164, 1948.

7. Burchell, H. B.; Pruitt, R. D., and Barnes, A. R.: Stress and Electrocardiogram in Induced Hypoxemia Test for Coronary Insufficiency, Am. Heart J. **36**: 373, 1948.

8. Malmström, G.: Cardiological Anoxemia Test with Special Reference to its Standardization; Clinical and Physiological Study, Acta med. scandinav. supp. **195**: 1, 1947.

9. Dock, W., and Taubman, F.: Some Techniques for Recording the Ballistocardiogram Directly from the Body, Am. J. Med. **7**: 751, 1949. Dock, W.; Mandelbaum, H., and Mandelbaum, R. A.: Ballistocardiography in Medical Practice, J. A. M. A. **146**: 1284 (Aug. 4), 1951.

Method.—The patient lies prone on an immobile table. The longitudinal ballistic body motions are transmitted by a crossbar on the shins. This cuts the light falling on a photoelectric cell pick-up device. The record is taken on the customary electrocardiographic machine. We have devised a dual apparatus of the Dock body type, which permits the recording of either photocell (displacement) or electromagnetic (velocity) ballistocardiograms.[11] For time reference, simultaneous electrocardiograms and ballistocardiograms may be taken simply, even on single channel electrocardiographs. The ballistocardiogram is then recorded during quiet respiration and deep inspiration and expiration.

Criteria for Interpretation of Ballistocardiogram.—The normal ballistocardiogram, as illustrated in figure 6, is of a W-shaped appearance. According to Starr,[12] the component waves are labeled in alphabetical order, starting with the letter "H" (this represents the first headward motion occurring with each cardiac cycle). The

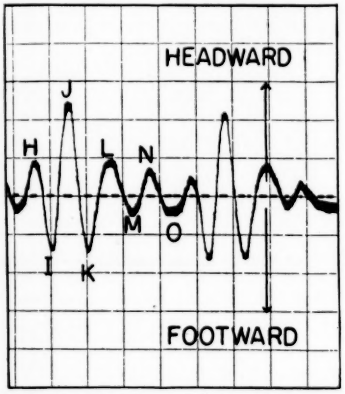

Fig. 6.—Normal ballistocardiogram. Key: H = apical thrust; I = ejection in early systole; J = impact on aortic arch and acceleration in aorta; K = deceleration in descending aorta; LMNO = after vibrations or forced thrusts.

key in the legend of figure 6 presents the cardiovascular events associated with the various waves. No attempt has been made, with this method, to interpret the ballistocardiographic tracings on a quantitative basis, as a measure of cardiac output. The records have been interpreted solely on the qualitative appearance of the component waves of the ballistocardiogram. The amplitude of the I-wave is normally slightly less than that of the K-wave. The J-wave is the most prominent headward wave.

There is a normal respiratory variation in the amplitude of the complexes, i. e., the waves are of greater amplitude during inspiration than during expiration. Abnormal ballistocardiogram patterns include: (1) diminished or absent I-waves; (2) exaggeration of the normal respiratory variation, i. e., the amplitude of waves during expiration are 50% or less than that during inspiration; (3) definitely slurred or notched I, J, or K-waves; (4) prominent H-waves (early M-pattern); (5) late, deeply notched J-waves (late M-pattern); (6) prominent diastolic waves (L, M, N, etc.); (7) deep, wide, or absent K-waves; (8) low amplitude or totally bizarre complexes. These alterations may occur alone or in various combinations in any one case.

Results.—The ballistocardiogram at rest is normal in approximately 90% of normal patients. Our criteria for the selection of normal persons in this study included a normal double "2-step" exercise electrocardiogram as well as normal routine cardiac findings. An abnormal ballistocardiogram is of greater diagnostic value in patients under 50 because thereafter the tracing may be altered by the normal physiological aging processes. Normal ballistocardiogram records in patients over 50, however, are of definite diagnostic significance.

The ballistocardiogram is of value in the diagnosis of coronary artery disease. In 93% of patients with angina pectoris who had abnormal resting electrocardiograms, the ballistocardiograms were also abnormal. In 85% of patients with angina pectoris who showed normal resting electrocardiograms but abnormal "2-step" exercise tests, the ballistocardiograms even at rest were abnormal. This figure increased to 90% after standard exercise. Since cardiac ejection may be altered only after exertion the ballistocardiogram should be recorded after standard exercise if the resting record is normal. We found a close correlation between abnormal "2-step" exercise tests and abnormal ballistocardiograms. Because one records electrical and the other mechanical events, both should be employed routinely in the evaluation of cardiac function.

The ballistocardiogram is abnormal in an extremely high percentage of hypertensive patients; in such cases, therefore, the cardiac diagnostic value of the procedure is limited. After lowering of the blood pressure by sympatholytic drugs, we have, indeed, observed the ballistocardiogram revert to normal. Eighty-one per cent of patients with previous myocardial infarction showed abnormal ballistocardiograms at rest, whether the resting electrocardiogram was abnormal or not.

The ballistocardiogram has been reported to be of great help in the management of patients with acute rheumatic fever and other acute diseases of the heart, as well as of those with myocardial infarction. By its use corroborative diagnostic evidence may be obtained in cases of coarctation of the aorta.

To the simplicity of the technique of recording the Dock type ballistocardiogram is added the advantage of the absence of danger to the patient. This is of obvious importance in industrial medicine. The ballistocardiogram reflects the functional state of the heart, regardless of the type of cardiac pathological condition present. Therefore, ballistocardiography appears to be a safe and valuable instrument supplementary to electrocardiography for the routine study of cardiac function.

10. Pordy, L., and others: Clinical Evaluation of the Ballistocardiogram. I. Normals, Am. Heart J. **42**: 321, 1951. Chesky, K., and others: Clinical Evaluation of the Ballistocardiogram. II. Heart Disease—Hypertension, Angina Pectoris and Myocardial Infarction, ibid. **42**: 328, 1951. Taymor, R. C., and others: The Ballistocardiogram in Coronary Artery Disease, J. A. M. A. **148**: 419 (Feb. 9) 1952. Moser, M., and others: The Ballistocardiogram in Myocardial Infarction: Study of One Hundred Cases, Circulation, to be published.

11. Pordy, L., and others: The Dual Displacement and Velocity Ballistocardiograph Apparatus, to be published.

12. Starr, I.; Rawson, A. J.; Schroeder, H. A., and Joseph, N. R.: Studies on Estimation of Cardiac Output in Man and of Abnormalities in Cardiac Function, from Heart's Recoil and Blood's Impacts; Ballistocardiogram, Am. J. Physiol. **127**: 1, 1939.

KRASNO-IVY NITROGLYCERIN FLICKER TEST

In 1950 Krasno and Ivy [13] described a reliable, portable machine, the "flicker photometer," or "flicker meter," for cardiac diagnosis in office practice. The "flicker photometer" is used to determine the threshold of the fusion frequency of flicker (FFT). The fusion frequency of flicker is that frequency at which successive flashes of light appear continuous, or free from flicker, to the patient. The machine is so constructed that one may easily regulate the number of flashes of light delivered per minute.

Method.—The patient is seated comfortably in a quiet room, 5 ft. from the frosted glass window of the machine. Tobacco, alcohol, and vasodilator drugs should not be taken prior to the test. If glasses are worn ordinarily, they should be used during the examination. The light source of the room must be directed away from the patient's eyes.

After a 10 minute rest, the test is started, and the machine is turned on. The patient is instructed to say "now" when the light in the frosted glass window first appears to flicker, while the operator controls the flicker rate knob. Three successive similar readings serve as the control fusion frequency of flicker, or baseline for the subject. After sublingual administration of nitroglycerin (1/150 grain), the procedure is repeated at two minute intervals for six minutes. This constitutes the single test. If any one of the postnitroglycerin administration baselines or fusion frequency of flicker does not vary from the control by ±60 flashes per minute, "no change" has occurred ("fixed" response). The procedure is then repeated after a second nitroglycerin tablet has been given (the double test). Intravenous or intramuscular papaverine (50 mg.) may be substituted for the nitroglycerin.

Criteria for Interpretation.—A normal response is one in which the fusion frequency of flicker after nitroglycerin administration is decreased by 60 flashes or more per minute below the patient's baseline. Abnormal tests are those in which the fusion frequency of flicker readings after nitroglycerin administration are increased by 60 flashes or more per minute above the patient's baseline.

The impairment of the fusion frequency of flicker after nitroglycerin administration in normal persons is explained by vasodilatation, with resultant passive congestion of the retina. Krasno and Ivy noted an "abnormal" response in 99% of patients with hypertension or coronary artery disease. The improvement of the fusion frequency of flicker after nitroglycerin administration in such cases is said to be related to the relief of vasospasm and the resultant active hyperemia of the retina. The nitroglycerin flicker test is described as an aid in the diagnosis of equivocal cases of coronary artery disease and hypertension.

Results.—We have studied the nitroglycerin flicker test with Dr. Jack Matis, of New York, in a preliminary group of 126 patients. There were 83 men and 43 women, whose ages ranged from 17 to 83 years. Thirteen of those tested were normal. They were selected on the basis of normal cardiac findings, including a normal resting electrocardiogram and, in most instances, a normal double "2-step" test. In this normal group the nitroglycerin flicker test showed a normal response in eight and an abnormal one in five. In one patient with diabetes mellitus and no clinical evidence of heart disease, the Krasno-Ivy test was abnormal. The remaining 112 patients all showed definite evidence of organic heart disease, on either a hypertensive or arteriosclerotic basis in most instances. The nitroglycerin flicker test in the cardiac group was abnormal in 85 patients, gave a "fixed" response in 14, and was normal in 13.

The results of the nitroglycerin flicker test will be correlated with the results of other cardiac function tests, and the findings reported later. Our preliminary work does not, as yet, permit a final evaluation of this test. It may be stated that the test has the disadvantage of depending on a subjective response of the patient. This may be overcome, however, by careful technique on the part of the examiner. A second objection to the procedure lies in the assumption that retinal vasospasm is indicative of coronary arterial spasm. Since the test is relatively easy to perform and without patent danger, however, its further study, in relation to the older, more established procedures, is recommended.

The discussion has been limited to the four procedures described. The value of circulation time, venous pressure, vital capacity readings, and roentgenokymograms in the study of cardiac function has been accepted for years, and, therefore, these tests have not received special consideration in this paper. Newer promising methods, such as the oxygen consumption during exercise,[14] may prove to be practical for measuring cardiac reserve. The importance of standardization of procedures in cardiac diagnosis cannot be overemphasized.

SUMMARY AND CONCLUSION

The necessity for dependable cardiac function tests, especially in industry, is demonstrated by the large number of patients with heart disease in whom the routine clinical studies are all normal. The "2-step" exercise electrocardiogram test is described. Its value is confirmed by follow-up studies of 200 patients with normal and abnormal tests. A diagnosis of coronary insufficiency is practically, but not absolutely, excluded if both the single and double "2-step" tests are normal. An abnormal single or double "2-step" test is objective evidence of coronary insufficiency. The anoxemia (10% oxygen) test is not recommended for the routine evaluation of cardiac function in industry. Its yield of abnormal tests in cardiac patients is relatively small. It is hazardous and requires constant supervision. Ballistocardiography, by the simple Dock technique, is described as a valuable supplement to electrocardiography and exercise tests in the cardiac diagnostic armamentarium. It is too early to evaluate properly the Krasno-Ivy nitroglycerin flicker test, but further study of it is definitely warranted.

In industry, as in clinical practice, a battery of cardiac function tests should be employed routinely and regularly for the early detection of pathological cardiac states and for the accurate evaluation of heart function.

1150 Park Ave. (Dr. Pordy).

13. Krasno, L. R., and Ivy, A. C.: Response of Flicker Fusion Threshold to Nitroglycerin and Its Potential Value in Diagnosis, Prognosis and Therapy of Subclinical and Clinical Cardiovascular Disease, Circulation **1**: 1267, 1950.

14. Chesky, K., and Sise, H. S.: Use of Oxygen Consumption During Exercise as a Quantitative Measure of Cardiac Reserve, abstracted in Proc. Am. Fed. Clin. Research **5**: 20, 1949.

CATION EXCHANGE RESINS AS AN ADJUNCT IN TREATMENT OF HEART FAILURE

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and
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Restriction of sodium in the diet has been accepted as helpful in the management of many patients with congestive heart failure and certain patients with other forms of edema, but the ideal sodium intake cannot always be accomplished by diet alone. In 1946, Dock [1] suggested that a cation resin could be used to remove sodium, potassium, calcium, and magnesium from ingested foods and further indicated that such a resin was nontoxic for dogs and rats. Extensive studies in animals [2] have demonstrated further the absence of toxicity from cation resins over short and long periods. These observers find that prolonged administration of the ammonium form of resin has not interfered with health, nutrition, or hematological development of animals. A detailed review [3] of the literature on ion exchange resins and edema discusses fully the rationale for the use of these substances.

A cation exchange resin can also restrict the absorption of sodium from the human intestine,[4] and its use has been found practical and effective in man.[4b, d] The availability of a large number of sodium ions in solution in the gut and a relatively low concentration in solution of certain other cations [4a] favors fixation of large amounts of sodium over calcium and magnesium, for example. However, the problem of potassium fixation and interference with potassium absorption initially offered some difficulty. Early experience with the ammonium form of a cation exchanger indicated considerable loss of potassium as well as sodium via the stools, so that doubt was expressed as to the advisability of administration of this form of resin to patients for fear of hypokalemia.[4b, d, f]

The solution to this problem has been brought to our attention on a previous occasion.[4b, c, d] A mixture of ammonium and potassium forms a carboxyl resin leads to the formation of potassium chloride and ammonium chloride in the acid pH of the stomach. As these substances enter the upper intestine both ammonium chloride and potassium chloride are absorbed before the rising pH of the intestine activates the resin and fixes the cations of NH_4+ and $K+$, as well as $Na+$ and other cations. In this fashion, enough extra $K+$ is absorbed to offset the $K+$ fixed in the gut by the resin. Also, ammonium chloride is absorbed in considerable amount.

In a previous communication,[4b] we have shown through a study of urinary secretion of potassium and serum potassium levels that the above hypothesis appears to hold in man and that certain cation exchange resins may be used with reasonable safety in the management of edema. It is the purpose of this discussion to outline the use of a cation exchange resin (resodec®)[5] in the treatment of congestive heart failure and certain other forms of edema. Our original experience with 10 patients [4b] has been expanded to a total of 50, of whom 35 are discussed here. Resodec® has been administered to three subjects without edema, 22 patients with congestive heart failure, 5 with cirrhosis of the liver and ascites, 3 with the edema of the nephrotic syndrome, and 2 with constrictive pericarditis and edema. Studies including 24-hour urine excretion of sodium and potassium, interval determinations of plasma chloride, plasma bicarbonate, serum sodium, serum potassium, and blood urea have been carried out in many hospital patients, while less detailed study has been made in a few outpatients. Frequent weight recordings have indicated gain or loss of edema.

INDICATIONS

The cation resin is not a cure-all and not a complete solution to the sodium restriction problem in patients with edema. A subsequent paragraph will indicate that the capacity of the resin is not sufficient to restrict sodium absorption from a full diet, and a patient must not expect to eat as much salt as he wishes. Furthermore, the cation resin is not indicated in all patients with heart failure. Many patients with congestive heart failure respond to rest, digitalis, and moderate dietary restriction of sodium and will remain compensated for months or even years under such a regimen. However, other patients with heart failure and edema are unable to attain a suitable level of sodium restriction. In these, proper administra-

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2. Flanagan, T. L.; Sax, M. F., and Heming, A. E.: Toxicity Studies on Amberlite XE-96, a Carboxylic Type Cation Exchange Resin, Federation Proc. **10**: 295 (March) 1951.

3. McChesney, E. W.; Dock, W., and Tainter, M. L.: Ion Exchange Resins in Edema, Medicine **30**: 183 (May) 1951.

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5. Resodec® used in the study has been furnished by Smith, Kline and French of Philadelphia. It is a highly cross-linked, polyacrylic polycarboxylic cation exchange resin. It contains enough of the potassium resin to provide 20 mEq. of potassium per dose, and the balance is made up of ammonium resin. This figures out to 3.33 gm. (dry weight) of potassium resin and 11.67 gm. (dry weight) of ammonium resin.[4e] This is referred to in this paper as resin 3.

tion of a cation resin may be helpful as an adjunct in treatment. This is particularly true of patients with long-standing chronic congestion who have become refractory to mercury. In brief, the more severe and more refractory cases of congestive heart failure appear to be the ones to whom this principle may be properly applied.

In addition, as noted below, it has been our experience that the obstinate edema associated with nephrosis may sometimes respond to this method of therapy. Diuresis in several patients with cirrhosis of the liver and ascites has followed resin administration alone, while potentiation of mercurial diuresis by the cation resin has been particularly striking in patients with cirrhosis. Recently, an excessive edematous patient with constrictive pericarditis was better fitted to face the ordeal of operation after the use of a cation resin.

DOSAGE AND ADMINISTRATION

The dosage of resodec® and the diet to be recommended during its administration depend somewhat on the degree and duration of the edema and the patient's initial reaction to resin administration. The resin appears to work at full capacity in the normal person who does not have edema.[4c] Our own experience is shown in figure 1. Here a decrease in urinary sodium excretion is very marked with the feeding of resodec® to a normal subject for three days. Continued depression of urinary sodium excretion for at least two days after discontinuance of the resin has been commonly observed. In the patient with congestive heart failure, however, the amount of sodium bound by the resin appears to be somewhat lower, the reason for this remaining unclear at the moment.[4c] It has been our experience [4b] that the ammonium cation resin is somewhat more efficient gram for gram as regards the binding of the sodium than the ammonium-potassium resin, but the disparity has not been great, and in nearly all patients receiving the ammonium-potassium resin we have found the dosage of 15 gm. three times daily to be adequate when the patient was on a 1,000 mg. intake of dietary sodium (2.5 gm. of salt). Only an occasional patient has profited by larger dosage of cation resin, and more than a total of 60 gm. daily is unnecessary with this diet. A few instances of severe congestive heart failure have required still further dietary restriction to 500 mg. of dietary sodium daily (1.25 gm. of salt), but we have kept the resin dosage at 15 gm. three or four times daily. A bedtime dose of 15 gm. of resin has not proved salutary in our experience. When larger dosage is required, it should be given after the regular meals rather than at bedtime. It would appear that sufficient experience has accumulated [6] to indicate that the ammonium potassium cation carboxylic resin has an adequate capacity for therapeutic purposes and may prevent, in dosage of 45 to 60 gm. daily, the absorption of 40 to 100 mEq. of sodium. This, as indicated, will vary with the individual patient, depending chiefly on the degree of his edema and the magnitude of his sodium intake. After various trials, it appears wiser to us to administer the cation resin intermittently, four days on and three days off. In this study and previously [4b] it has been noted that sodium absorption restriction has continued one to five days after the resin dosage has been discontinued, the lag averaging about three days. Many patients appreciate the three days without resin and appear to get along somewhat better on this schedule.

For certain other patients who have been dependent on regular injections of mercury prior to the use of resin, it has been found that, once they can be brought out of the edematous state, it may be possible to maintain them edema-free on a slightly smaller dose of resin, namely, 15 gm. twice daily.

The taste of the resin is not pleasant, and it is best to take it in fruit juice, preferably one-half glass of grapefruit juice, stirred or shaken well and swallowed immediately. Although a few patients object strenuously to the taste, we have not found this to be a serious handicap, and those sick enough to require the resin generally overlook this relatively minor inconvenience.

GENERAL AND SPECIFIC EFFECTS

Some effects produced by administration of an ammonium and potassium resin (resodec®) have been observed in the study of 35 patients. It is not always

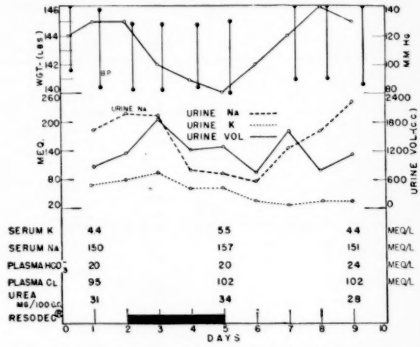

Fig. 1.—W. M., 54. Effect of ammonium cation resin, 45 gm. daily, on a subject with no disease and on a normal diet.

possible to explain all of these or to evaluate the true therapeutic value of the cation resin while other measures of treatment are being used. However, it was our impression that the resin produced a decided restriction of sodium reabsorption in the three nonedematous patients studied, perhaps a mild acidosis and perhaps a slight elevation of plasma chloride (fig. 1). In this and other [4b] studies on normal subjects, restricted sodium absorption was demonstrated by a sharp decline in urinary sodium excretion during resin administration and, as noted above, the effect lasted several days after the resin was discontinued.

In cardiovascular patients with edema, 15 of 22 patients showed additional clinical improvement, which seemed to be attributable to the resin. In seven of these the results were striking, as conventional measures with digitalis, ammonium chloride, and mercury had previously failed.

6. Irvin, Berger and Rosenberg,[4a] Hay and Wood,[4b] Kahn and Emerson,[4d] Dock, W., and Frank, N. R.: Cation Exchangers: Their Use and Hazards as Aids in Managing Edema, Am. Heart J. **40**: 638 (Oct.) 1950.

The salutary effect of restriction of sodium absorption is well illustrated in H. E. (see accompanying table). This patient, a woman of 60, with advanced rheumatic heart disease, aortic regurgitation, and mitral stenosis, had had congestive heart failure and edema for months. For over a year she had received a mercurial diuretic every 10 days, each injection preceded for three days by 6 to 8 gm. of ammonium chloride daily. This routine became less and less effective, and she entered the hospital for ammonium potassium cation resin therapy (Day 1, table). Up to this time she had been on a diet of 1,000 mg. of sodium, to which she had faithfully adhered. Complete digitalization with digitoxin had been maintained for years and the daily ration unchanged. No medication was given except the usual digitoxin and resodec.® Although excreting no urinary sodium at the time, owing to progressive fluid retention, her urinary sodium remained at zero after resodec® therapy in spite of steady diuresis and loss of edema. Urinary potassium excretion was maintained at adequate levels, and serum potassium remained normal. Plasma chloride levels remained normal in spite of marked diuresis, and a mild to moderate loss of plasma bicarbonate returned toward normal even with continued resin administration. The patient was discharged on the fifth hospital day and handled thereafter as an outpatient. On the 12th day resodec® was reduced to 30 gm. daily and relatively edema-free weight maintained on this dosage. No diuretic of any kind has been given since the first day of resodec® therapy, and she has continued to remain up and around with minimal edema on this regimen for over two months.

Results of Restriction of Sodium Absorption in Patient H. E.

Day	Weight, Lb.	Urine Cc./24 Hr.	mEq./24 Hr. Urinary Na	mEq./24 Hr. Urinary K	Serum Na	mEq./L. Serum K	mEq./L. Plasma Cl	Plasma HCO_3	Mg. % Urea	Gm./Day Resin 3
1	137	.....	..	..	...	...	...	..	..	..
2	136¾	2,120	0	33	...	...	102	24	36	..
3	135¾	4,500	0	63	...	...	...	..	..	60
4	133¾	3,070	0	47	144	4.6	...	..	..	60
5	130½	3,170	0	65	...	...	...	..	..	60
6	128¾	.....	..	..	...	...	104	13	..	45
7	128½	.....	..	..	...	...	...	..	..	45
8	127½	2,370	0	26	...	...	...	..	..	45
9	124½	.....	..	..	145	4.1	104	15	37	45
10	124	.....	..	..	...	...	...	..	..	45
11	124	2,550	0	30	...	...	...	..	..	45
12	122¾	.....	..	..	150	4.8	104	18	25	30
13	121	.....	..	..	...	...	...	..	..	30
14	.....	.....	..	..	...	...	...	..	..	..
24	124	2,600	0	33	...	...	...	..	..	30
25	124	.....	..	..	141	4.4	95	20	32	30
60	123	.....	..	..	...	...	107	21	38	30

In 16 of these 22 patients with congestive heart failure, slight to moderate diuresis occurred with the resin alone, and in two patients a marked diuresis occurred with the resin alone.

The mechanism by which a cation resin produces diuresis is not clear, unless it be the ammonium chloride effect as well as the restriction of sodium absorption. In 8 of 18 cases, marked potentiation of the mercurial diuretic followed the administration of resin and moderate potentiation of the mercurial diuretic followed resin administration in 3 cases, with a slight or indifferent effect in 7. The remaining four patients with congestive heart failure did not require a mercury diuretic. In five patients resodec® appeared to restore successful mercury diuresis where ammonium chloride had previously failed.

The potentiation of mercurial diuresis by a cation resin has been noted by other observers. The mechanism involved is hard to clarify, as studies along this line are difficult to control. The obvious explanation, of course, would be the fact that a daily dose of 45 to 60 gm. of resodec® would be theoretically equivalent to a daily dose of approximately 8 to 10 gm. of ammonium chloride. Since this figure is slightly above the customary dosage of 6 to 8 gm. of ammonium chloride daily, it is entirely possible that the success of this cation resin in the potentiation of mercury may be due to a larger ammonium chloride dosage. However, the obvious advantage of potentiation of a mercurial diuretic plus the restriction of sodium absorption is well illustrated in figure 2. Here the postdiuresis reaccumulation of edema is avoided by sodium absorption restriction, and relief from heart failure proceeds smoothly and steadily. D. D. M., the patient for whom data is charted in figure 2, was admitted with rheumatic heart disease, mitral stenosis, auricular fibrillation and advanced congestive heart failure, marked edema and ascites. Heart failure had occurred four and one-half months before, while edema and ascites had increased in spite of rest in bed, digitalization, and dietary salt restriction. Repeated mercurial injections had become progressively ineffective. Diuresis and loss of edema began with resin alone, and marked potentiation of mercury reappeared. Progressive loss of edema proceeded with a zero urinary excretion of sodium, but a continued urinary potassium excretion and adequate serum potassium levels. Early intermittent resodec® dosage gave way to smaller (15 gm. twice daily) dosage, with absence of edema despite resumption of activity. Plasma chloride levels were well maintained except after marked mercurial diuresis on the 20th day, but resumption of resodec® therapy was followed by normal plasma chloride levels.

The whole question of potentiation of mercurial diuretic by a cation resin needs further study. In this regard it may be noted that resodec® brought about an elevation of the plasma chloride from a lower to a higher figure in 15 of 16 patients with congestive heart failure where this observation was made. Furthermore, a mild

to moderate acidosis was produced in 10 of 14 patients with congestive heart failure. Cation resin administration, therefore, leads to the two states commonly accepted as necessary for potentiation of mercurial diuresis, namely, adequate plasma chloride levels and diminished plasma bicarbonate levels.[7] Again it is not clear whether these two effects are the result of ammonium chloride absorption associated with administration of ammonium-potassium cation resin or a combination of this and the restriction of sodium absorption.

CONTRAINDICATIONS, DANGERS, AND DISCOMFORTS

With the ammonium potassium form of the cation resin (resodec®) relatively little gastrointestinal irritation has occurred. In 4 of the 35 patients some nausea and vomiting followed the ingestion of the resin; two of these were in the nephrosis group. One of the patients with nephrosis, however, was able to overcome this difficulty, and definite fluid loss followed. Rectal irritation with a slight burning sensation of the rectum was a common complaint, but this was minor in all instances. We have not encountered fecal impaction in the moderate dosage recommended in this communication. Diarrhea occasionally sets in but may disappear with curtailed dosage. It is our impression that the unfavorable gastrointestinal effects previously reported may have been due to larger dosage. Taste of the ammonium-potassium cation resin resodec,® as noted above, though not pleasant is certainly not prohibitive.

Depletion of potassium has not been a troublesome feature with the use of the ammonium-potassium form of the resin. The lowest serum potassium level noted fell within the range of normal, namely, 3.2 mEq. per liter. Normal serum potassium levels, of course, are not proof against potassium depletion, but continued positive urinary potassium excretion offers added evidence that adequate potassium was available to the patient. Clinical evidence of hypokalemia has been suggested in only two patients, in whom digitalis toxicity, unexplained by edema loss alone, seemed to develop.[4b] Balance experiments must finally settle this matter, but, in the absence of clinical signs or symptoms and with liberal daily potassium excretion in 26 treated patients studied, it would seem unlikely that hypokalemia could be a hazard with an ammonium-potassium cation resin. Contrariwise, we have had no instances of potassium poisoning, although care has been taken to avoid the prolonged administration of cation resin to patients with renal insufficiency.

We have not studied calcium and magnesium metabolism in these patients, but a previous balance study [4a] indicates that no detectable calcium deficiency occurs.

Acidosis would appear to be only a moderate hazard. We were able to study this feature in 23 of our 35 patients. Fifteen of these patients had a carbon dioxide-combining power below 20 mEq. per liter, the lowest being 11 mEq. per liter. On a number of occasions we have seen the plasma bicarbonate fall slightly to moderately, only to recover to more normal levels with a continuation of resin (see accompanying table). This sequence is based on the increased ammonium production by the kidney and is similar to events following ammonium chloride administration.[4a,d] In no instance has the acidosis appeared to be a clinical hazard where adequate renal function was present, and its value in the potentiation of mercury diuresis has been alluded to above. So far we have worked with only the ammonium, hydrogen, and ammonium-potassium exchangers, and we are unable to comment at length at this time on the possible value of the mixture of an anion resin with an ammonium-potassium resin to offset acidosis.[8] It is our impression that reaction of plasma bicarbonate levels following this mixture is somewhat similar to the effects produced by other resins.

LOW SALT SYNDROME AND RENAL INSUFFICIENCY

The hazard of the low salt syndrome has been set aside for separate discussion, owing to its obvious importance. The continued use of a potent cation resin in patients similar to the ones described here might well lead in some to the dangerous low salt syndrome already adequately described by Schroeder several years ago.[9] This occurred in our study twice. In one, during resin

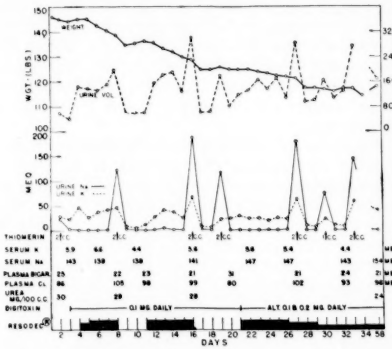

Fig. 2.—D. D. M., 25, married, female. Severe congestive heart failure with ascites and edema. Highest black rectangle represents 60 gm. of resin daily, next lowest 45 gm. daily, and final maintenance dosage of 30 gm. daily. Patient received approximately 1,000 mg. of dietary sodium daily.

therapy, the serum sodium was 139 mEq. per liter, with a low plasma chloride of 86 mEq. and a serum potassium of 3.6 mEq. per liter. The blood urea rose, and the patient appeared to be quite sick but responded to hypertonic salt intravenously and potassium chloride by mouth with subsequent diuresis, restoration of normal blood urea levels, and a return of appetite. It is our impression from this and other experiences that it is inadvisable to administer the cation resin to patients who are not eating well, and it cannot be emphasized too strongly that the

7. Ethridge, C. B.; Myers, D. W., and Fulton, M. N.: Modifying Effect of Various Inorganic Salts on the Diuretic Action of Salyrgan, Arch. Int. Med. **57**: 714 (April) 1936. Evans, W. A., Jr.: The Effect of Salt and Water Metabolism Upon Salyrgan Diuresis (with Special Reference to the Effect of Permanent Bile Fistula), in Medical Papers Dedicated to Henry Asbury Christian, Boston, R. T. Monroe, 721 Huntington Ave., 1936, p. 204-222.

8. Martz, B. L.; Kohlstaedt, K. G., and Helmer, O. M.: The Use of Ion Exchange Resins in the Management of Congestive Heart Failure and Cirrhosis of the Liver, J. Lab. & Clin. Med. **36**: 962 (Dec.) 1950.

9. Schroeder, H. A.: Renal Failure Associated with Low Extracellular Sodium Chloride: Low Salt Syndrome, J. A. M. A. **141**: 117 (Sept. 10) 1949.

use of a cation resin in the face of renal insufficiency is probably an extremely dangerous and hazardous procedure.

In one patient with chronic glomerular nephritis, uremia, and massive edema, the resin was deliberately used in the face of renal insufficiency, with resulting moderately severe acidosis. Considerable edema fluid was lost, with relief to the patient, but the blood urea mounted rapidly from 88 mg. per 100 cc. to 177 mg. per 100 cc. Renal insufficiency has been commonly accepted as a prime contraindication to cation resin administration. Effects of sodium depletion by resin therapy during uremia and the unfavorable mechanisms involved have been recorded recently.[10]

Emphasis must be placed on two dangers from cation resin administration: (*a*) possible production of the low salt syndrome and (*b*) aggravation of an already established renal insufficiency.

OTHER FORMS OF EDEMA

Five patients with cirrhosis of the liver, edema, and ascites have received the resin from 4 to 15 days. Four of the five patients studied had proved biopsy diagnosis of portal cirrhosis. Two patients showed a marked diuresis on resin therapy alone. The remaining three showed a marked mercurial effect following resin therapy, although mercury and ammonium chloride had previously failed in two.

Three patients with the nephrotic syndrome of chronic nephritis were studied. One appeared to be a failure largely because of the accompanying glomerulonephritis; obviously he was not a suitable candidate for the cation resin, which produced nausea. In the other who had the nephrotic syndrome associated with chronic glomerulonephritis, the renal function was good at the time, and a moderate diuretic response followed the cation resin alone. Also marked mercurial diuresis helped bring about a loss of 42 lb. (19 kg.) in a period of 23 days. Here again the diuresis may have been spontaneous and coincident with resin administration, but at least the patient had been refractory to the usual methods of treatment for six weeks prior to resin administration. This patient has remained well and edema-free for several months, with complete resumption of all activity. A less favorable experience occurred in a child of 6 years. For months she had been water-logged and refractory to treatment. Either coincident with or as a result of resin administration, moderate to marked diuresis occurred without and with mercury. Renal failure increased and azotemia mounted, so that the resin was discontinued. Again it would seem that adequate renal function in the nephrotic syndrome should be prerequisite to cation resin administration.

Two patients with constrictive pericarditis were observed after resin administration. One appeared to show a moderate loss of edema from resin effect, while the other benefited decidedly by moderate diuresis from the resin alone and moderate to marked potentiation of a mercurial diuretic.

MINIMAL PRECAUTIONS

The question has arisen on a number of occasions as to just what simple rules should be followed to insure relative safety during administration of a cation resin. Obviously, all physicians may not be able to follow patients with detailed chemical analyses.

It would seem unwise to administer resin to a patient with an appreciable degree of renal insufficiency, and, generally speaking, nitrogen retention in the blood should be considered a contraindication to its use. Daily weight recordings are essential to the management of an edematous patient. Finally, a reasonably good appetite and a reasonably good flow of urine should be present before a cation resin is administered. During the early course of cation resin administration, there should be a slight to moderate increase in urinary flow. Moderate to marked diuresis nearly always follows a mercurial diuretic, and failure of mercurial diuresis during the course of resin administration may well be indicative of renal failure or the low salt syndrome or both. Hyperpnea, nausea, and vomiting are signals for immediate discontinuance of the resin, and these symptoms should be followed up by determinations of plasma chlorides, plasma bicarbonate, and blood urea, or similar blood nitrogen studies.

SUMMARY AND CONCLUSIONS

Resodec® has been administered to 50 subjects with and without edema for long and short periods. No serious uncontrollable toxic effects were noted. Some observations on 35 of these have been discussed. Hypokalemic effects encountered originally after the administration of an ammonium cation resin do not appear to occur with the ammonium-potassium cation resin. The low salt syndrome, azotemia, and mild to moderate transient acidosis represent the chief hazards associated with ammonium-potassium cation resin administration. Impaired renal function is the outstanding contraindication to its use. Restriction of sodium absorption is a useful therapeutic adjunct in certain patients with obstinate edema of heart failure, cirrhosis of the liver with ascites and edema, and perhaps edema of the nephrotic syndrome.

10. Nickel, J. F.; Lowrance, P., and Leifer, E.: Effect of Sodium Depletion and Repletion on Renal Function and Body Fluids During Uremia, abstracted, J. Clin. Invest. **30**: 664 (June) 1951.

Cardiac Resuscitation.—In the treatment of cardiac arrest under anesthesia, it is essential to obtain an adequately oxygenated cerebral circulation. Time is vital. To do this, artificial respiration must be started at once. Simultaneously, the heart must be made to function as a pump by means of cardiac massage. Intracardiac injections with epinephrine or any other drug are useless because it is unlikely that the heart will resume beating effectively, but will merely fibrillate and consume further valuable oxygen and time. Moreover, from the point of view of ultimate recovery, the heart which is in ventricular fibrillation is more difficult to start than one which has completely stopped. Experimentally, it can be shown that cardiac massage in the presence of ventricular fibrillation produces a very poor output and under these conditions it is impossible to restore normal rhythm. If, on cardiac massage, the heart is found to be in this state, every effort must be made to overcome it. Electrical defibrillators have been described for this purpose but they are not always readily available. In dogs, the application of ice to the fibrillating heart will inhibit it and enable normal rhythm to be started. This is, of course, applicable in man only when the thorax is open. An alternative method of stopping ventricular fibrillation is to supply the myocardium with oxygen. This can be done by intra-arterial transfusion with oxygenated blood at sufficient pressure to force it back into the coronary circulation. —B. G. B. Lucas, Some Observations on Anoxia, *Anesthesiology*, November, 1951.

TREATMENT OF SOME COMPLICATIONS OF COLLES' FRACTURE

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Colles' fracture is a fracture of the lower end of the radius, within 1 in. (2.54 cm.) of the articular surface of the radius, which may or may not be accompanied by a fracture of the styloid process of the ulna. The usual deformity is threefold: posterior displacement, posterior angulation, and radial deviation of the hand at the wrist. The bone ends are usually impacted. The injury results from a fall on the outstretched hand, and this accounts for the type of deformity produced.

In reducing the fracture, it is extremely important that the posterior displacement and angulation be corrected, so that there will be a full range of motion in volar flexion. The fracture is usually immobilized with the wrist in marked volar flexion, in order to obtain reduction of these deformities. It is frequently necessary that this be done, but in the majority of cases, immobilization may be carried out with the wrist straight or in slight flexion. Since exaggerated volar flexion is a position in which normal function is almost impossible, it is important that the wrist be placed in as nearly a straight line as is consistent with maintenance of the reduction. The wrist should be replaced in a functional position as soon as possible; usually, this can be done within two weeks after the injury. It is equally important to restore ulnar deviation, so that radial deformity of the wrist will be avoided. If impaction is severe, the fracture cannot be reduced until disimpaction has been performed. Disimpaction should be done as gently as possible, but, even with the greatest care, it may leave the lower end of the radius with a bony deficiency that requires prolonged immobilization in ulnar deviation to enable healing without deformity. Since ulnar deviation is a position of function, maintenance of this position, even for six to eight weeks, does not endanger function of the hand, if the fingers are used for ordinary purposes during the period of fixation.

Colles' fracture is probably the commonest of all fractures. It is treated by general practitioners, interns, residents, general surgeons, and orthopedists. It's frequency renders it less formidable to the medical profession. The majority of cases result in painless function and a satisfactory range of motion after enough time has elapsed; however, bad end results and prolonged disability not infrequently follow Colles' fracture. This is rarely the result of inadequate reduction, since every clinical teacher emphasizes the necessity for adequate reduction in all fractures. The poor results are usually a consequence of lack of recognition of the importance of soft tissue damage as a cause of disability following fracture. Some of the complications causing poor function following Colles' fracture and methods of preventing or overcoming them will be discussed.

POST-TRAUMATIC FIBROSIS

Probably the most frequent cause of disability is the fibrosis produced in the soft tissues following prolonged swelling. Nearly all fractures are accompanied by hematoma formation or extravasation of blood as a result of the trauma causing the injury. In addition, further swelling may be produced by the formation of traumatic edema fluid, either immediately after the injury or from mechanical causes interfering with the return circulation. Both hemorrhage and traumatic edema fluid are removed from the tissue spaces by the same processes, namely, absorption or organization. Absorption must take place within the first 7 to 10 days after the fracture, since organization proceeds at a rapid rate and is often well developed by the end of the second week. If organization occurs, fibrous bands are formed that may produce adhesions and interfere with the circulatory and lymphatic return flow. If formed near the joints, they limit movement and cause painful motion. In other areas, they cause the thick, brawny induration and shiny skin that is characteristic of these cases. The process of organization is concomitant with, and analogous to, the process of organization between bone ends that results in the formation of fibrous callus. In some instances, it may even eventuate in the deposition of calcium within the soft tissues; this is called myositis ossificans. I have never seen this near the wrist.

Since this process is simultaneous with bone healing, it is important that treatment for soft tissue damage be carried on while the bone is healing. Measures to assist the removal of edema fluid should be started as soon as the fracture is reduced. The best method of combating persistent swelling is motion of the muscles. Thus, there are two apparently antagonistic objectives to be attained at the same time; the fracture line must be continuously immobile to promote healing of the bone, while the muscles must be kept moving to assist the removal of edema and promote the function of the soft tissues. Both these objectives can be accomplished if a well-fitted but nonpadded plaster splint or cast is applied after adequate reduction and then trimmed for function. This means that the cast must be cut back to the flexion crease in the palm and behind the knuckle joints on the dorsum of the hand. In addition, the thumb must be trimmed so that opposition as well as flexion and extension are possible, since opposition is the most important movement of the thumb. The cast must be trimmed at the elbow, so that it will not interfere with flexion and extension, and if pronation and supination are desired, it must be trimmed considerably below the elbow. If this is done, even though the wrist may be in considerable flexion to maintain reduction, a great deal of function is possible throughout the healing period. The activity of normal function during the healing period is the best method of decreasing swelling in the normal physiological manner. Persistent efforts should be made to convince the patient that the injured hand may be used for normal daily functions, such as eating, dressing, combing hair, shaving, writing, opening and closing doors, and even for work,

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if it does not involve heavy lifting or the immersion of the cast in water. Special instruction should be given that all three joints of each finger should be moved, the thumb should touch the little finger, and pronation and supination should be carried out with the elbow at right angles to prevent substitution of shoulder rotation for forearm rotation. The use of a sling should be discouraged, since activity is more feasible if the hand is available for constant use. If active motion is not effective, two other methods are available. The first is elevation. Usually, elevation has to be carried out with the patient in the recumbent position, with the extremity suspended from an overhead sling, since the ordinary sling, as worn in the erect position, does not reduce swelling, because it does not create a down grade all the way to the heart. However, exercise can be done at the same time. If neither of these methods is successful, heat and massage may be used to assist circulation and reduce swelling. A bivalved cast, half of which can be removed at a time to enable treatment during the acute stage, is usually worn. Great care must be taken with this method if the fragments are not to be displaced. Pain should never be produced during the acute stage of fracture. This method is more useful after the bone has healed, when there is no danger of displacing fragments; however, the likelihood of satisfactory results is greatly decreased if effective treatment is delayed until the bone has healed.

The shoulder is often involved in Colles' fracture. This is probably not due so much to direct trauma caused by falling on the shoulder or trauma produced by the force exerted through the arm to the shoulder as it is due to immobilization. The common practice of carrying the arm in a sling promotes such disability. In most cases, shoulder disability can be prevented by putting the hand behind the head and behind the back, daily. Putting the hand behind the head causes abduction and external rotation; putting the hand behind the back requires extension, adduction, and internal rotation. With these two exercises, all the more difficult movements are carried out. Occasionally, heat, massage, and exercise are necessary, particularly if activity has been limited during the early stages.

It is unfortunate that so many surgeons associate the term "physical therapy" with machine therapy. It is well known that physical therapy implies exercise, yet, in THE JOURNAL, the following statement was made by Cassebaum in an otherwise excellent report of a study of results in Colles' fracture: "When the splints were removed, active motion and exercises of the wrist were begun. These have a twofold purpose, namely, to increase motion and to redevelop the forearm muscles. Physical therapy was not used unless it was requested, and then its relative inferiority to active exercise was impressed on the patient. It was used for the occasional demoralized person who needed the feeling that something was being done for him and that others were interested. Through it more frequent contact with the patient was maintained. The daily application of moist heat proved helpful, and patients reported increased ranges of motion during this treatment."[1]

1. Cassebaum, W. H.: Colles' Fracture, J. A. M. A. **143**: 963 (July 15) 1950.

If we were to adhere to a definition of "physical therapy" as meaning treatment by physical means, including rest and manipulation as well as exercise, the entire care of the fracture, including the reduction and application of the cast, consists of physical therapy.

We have so far been discussing prevention of post-traumatic fibrosis; however, many patients are seen by the physiatrist in the late stages, when this fibrosis is well established. In these cases, the use of heat, preferably by whirlpool baths, followed by massage to reduce swelling, relieve pains, and stretch fibrous tissue, and then followed by exercise, using resistance exercises whenever possible, greatly expedites the return of function. Forcible manipulation, with or without anesthesia, is contraindicated, as it increases the trauma and swelling and, therefore, defeats its own objective. Occupational therapy provides excellent forms of exercise that can be adapted to increase the range of finger and wrist motion and increase strength and skill; in addition it may hold the interest of the patient, so that he will work at it for longer periods and more effectively than at other forms of exercise.

Sudeck's acute post-traumatic bone atrophy occasionally follows Colles' fracture. I have seen one patient in whom this occurred on two occasions, five years apart, following fracture of first one wrist and then the other. This condition is thought to be a reflex sympathetic dystrophy initiated by injury; it results in rapid bone atrophy. Roentgenograms show a spotty decalcification that may be severe enough to simulate tuberculosis. This is always accompanied by swelling and pain, even in the early stages. If activity is carried out from the beginning, this complication is extremely rare. The early performance of sympathetic block has been advised for these cases; however, I have usually not seen the patients early, and sympathetic block has been ineffective. The most effective treatment is activity, which is valuable in any manner that is feasible for the patient. Heat is contraindicated because it promotes bone atrophy. Electrical stimulation to produce muscle action may be of value in those cases in which the patient will not use the arm. This condition has a slow course, and the patient needs much encouragement during the recovery phase. As is common with other types of reflex sympathetic dystrophy, it occurs oftener in patients who are emotionally unstable, and this adds to the difficulties of their management. Occupational therapy is of great value, because it keeps the patient working longer at a time than is usually possible with conventional exercises.

Post-traumatic arthritis not infrequently accompanies Colles' fracture. Mechanical changes may occur in the joint surfaces, but it is not known whether the arthritis is a result of the fracture. The immobilization that accompanies the fracture is a factor in promoting this change. It usually occurs in thin, bony, elderly patients, and particularly in those patients who will not exercise or work if painful motions are necessary. After some months, roentgenograms show changes in the joint, consisting of cartilage loss and bone decalcification. The principles of treatment discussed under post-traumatic fibrosis are applicable here. It is usually difficult to tell when post-traumatic fibrosis ends and post-traumatic arthritis begins, for they may both be manifestations of the same process. In the thin, elderly patient, such com-

plications should be anticipated and explicit instructions from the time of reduction should be given, along with frequent checking to see that the instructions are followed. Rare complications include rupture of the extensor pollicis longus tendon or other tendons, stenosing tendovaginitis, and involvements of the median or ulnar nerves causing paresthesias. Some of these require surgical repair.

SUMMARY

1. Some of the problems associated with the reduction and immobilization of Colles' fracture are discussed.

2. The principles of treatment of the following complications were explained: post-traumatic fibrosis, Sudeck's acute post-traumatic bone atrophy, post-traumatic arthritis, and tendon and nerve injuries.

920 S. Seventh St.

ELECTROLYTE SOLUTION APPROXIMATING PLASMA CONCENTRATIONS

WITH INCREASED POTASSIUM FOR ROUTINE FLUID AND ELECTROLYTE REPLACEMENT

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Recent studies have emphasized the desirability of maintaining normal levels of electrolytes and water in plasma and tissue cells. This is difficult to accomplish because the electrolyte composition of the primary replacement solutions generally available for parenteral therapy is significantly different from normal plasma. For example, 0.9% sodium chloride solution contains too much chloride but no bicarbonate and no potassium.

Attempts were made, therefore, to devise a water solution of plasma electrolytes to correct most anomalies. Animal experiments were conducted to obtain the first approximations, and then the proposed solution was subjected to clinical trial. The results to date have been sufficiently encouraging to warrant this report of our observations.

ANIMAL EXPERIMENTS

Hemorrhage was investigated first because of its ubiquity and importance in medicine and surgery and its reproducibility in dogs. Massive volumes of blood were removed from unanesthetized dogs and concurrently replaced with an electrolyte solution.[1] During and after the hemorrhage the hematocrit readings (red blood cell volume), plasma proteins, and electrolytes [2] of plasma and urine were determined at frequent intervals. The same procedure was repeated with the same dog one or more months later, with removal of blood and administration of electrolyte solution, but a solution with a different combination of electrolytes was utilized for replacement.

A typical series with one dog is summarized in Table 1. When the replacement solution contained sodium equal to chloride, as in 0.9% sodium chloride solution, infusions during massive hemorrhage lowered the Na:Cl ratio in the plasma. To maintain normal bicarbonate and chloride concentrations in the plasma during the massive hemorrhage, Na:Cl ratios in excess of 140:100 (1.4) were needed in the infusion solution.

In the urine the Na:Cl ratio declined to 1.0 or less when sodium chloride solution only was infused, but when the Na:Cl ratio in the infusion was 1.4 or greater, the Na:Cl ratio in the urine exceeded 1.0. The electrolyte balance data show that the retention of chloride exceeded the retention of sodium in all experiments with sodium chloride solutions and emphasize the disadvantage of using chloride in replacement solutions in concentrations that are greater than the normal concentration of chloride in plasma.

Furthermore, after the massive removal of blood and its replacement with isotonic solutions of sodium salts only, the plasma potassium concentrations decreased markedly. Simultaneously, potassium equivalent to 10% to 20% of total body potassium was found in the large volumes of urine excreted. Thus in the experiments in Table 1 the total body potassium of the dog weighing 7 kg. is estimated to approximate 350 mEq., and urine potassium excretion after hemorrhage varied from 34 to 68 mEq. Graded additions of potassium to the sodium salt infusions showed that 10 mEq. per liter of solution approximated the minimum concentration that maintained plasma potassium at normal levels, although a negative balance of potassium still prevailed. In this connection it is noteworthy that decrease of plasma potassium was also observed in dogs dehydrated by loss of gastric juice and then rapidly rehydrated by infusions of sodium chloride only.[3] A further observation in all experiments was that, although the total plasma protein was reduced to below 2 gm. per 100 cc. and infusions of sodium salts up to one-third of body weight were given, no detectable edema, peripheral or pulmonary, resulted.

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The balanced electrolyte solution was prepared by the Research Division of the Cutter Laboratories (Dr. Walter E. Ward, Medical Director) in accordance with our formula for experimental study and clinical trials.

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1. Fox, C. L., Jr., and Freeman, B. B.: Electrolyte, Nitrogen and Protein Changes That Follow Massive Removal of Red Cells and Plasma Protein, Federation Proc. **8**: 49-50 (March) 1949.

2. Determinations of sodium and potassium in plasma, urine, and other biological samples were made with a stable internal standard flame photometer built in our laboratory. The construction, design and operation of this new instrument have recently been described in detail. (Fox, C. L., Jr.: Stable Internal Standard Flame Photometer for Potassium and Sodium Analyses, Anal. Chem. **23**: 137 [Jan.] 1951). This instrument is obtainable from the Janke Aircraft Engine Test Equipment Company, Hackensack, N. J.

3. Van Slyke, K. K., and Evans, E. I.: Unpublished data cited by Van Slyke.[28]

Since the toxicity of potassium is greatly enhanced in traumatic shock,[4] additional experiments were performed to ascertain whether an isotonic solution of sodium salts with 5 mEq. of potassium per liter in excess of the normal plasma potassium level would prove harmful in potentially fatal shock with concomitant hyperpotassemia. Shock was produced by Rosenthal's technique of a two-hour application and release of tight tourniquets to both hind legs of mice. The classical signs of shock developed, including cyanosis, dyspnea, hypothermia, and hypotension, followed in 6 to 12 hours by a mortality of 98% to 100% in untreated animals.[5] Treatment consisted of the administration in two divided doses of 150 cc. of solution per kilogram of body weight. The results are summarized in Table 2 and show that this isotonic solution with 10 mEq. per liter of potassium is not toxic. It should be noted that Rosenthal and Tabor [6] demonstrated the toxicity of potassium in solutions devoid of sodium; furthermore, the toxicity of infused potassium is usually referred to in connection with a solution containing 30 mEq. per liter of excess potassium but hypotonic with respect to sodium (Na:K equals 3.5, Darrow's solution, Table 3).

TABLE 1.—*Comparison of Effects of Various Replacement Solutions After Hemorrhage, Studied on Same Dog Over One Year*

	Hematocrit Reading, %	Plasma					Urine				Infusion			
		Protein, Gm. %	mEq./Liter				Vol., L.	Total mEq.			Vol., L.	Total mEq.		
			K	Na	Cl	HCO3*		K	Na	Cl		K	Na	Cl
First Experiment,† Wt. = 7.0 kg.														
Control 3/48	49	5.2	....	149	108	31	....	..	...	...	....	..	...	...
Post hemorrhage	13	1.4	....	150	135	5	0.86	17	125	136	....	..	...	...
15 hr. post hemorrhage	17	2.7	....	142	122	10	1.00	22	164	137	....	..	...	...
Totals/20 hr.	..	...	....	...	...	..	1.86	39	289	273	2.9	0	436	436
Net intake‡	..	...	....	...	...	..	....	..	...	...	2.4	..	366	383
Balance	..	...	....	...	...	..	+ 0.54	− 39	+ 77	+ 110	....	..	...	...
Second Experiment,§ Wt. = 7.4 kg.														
Control, 5/48	43	5.8	4.76	149	113	26	....	..	...	...	....	..	...	...
Post hemorrhage	16	1.7	1.96	142	103	29	0.90	29	187	114	....	..	...	...
15 hr. post hemorrhage	15	3.1	3.64	139	120	9	0.91	39	95	37	....	..	...	...
Totals/20 hr.	..	...	....	...	...	..	1.81	68	282	151	2.55	0	382	216
Net intake	..	...	....	...	...	..	....	..	...	...	2.05	0	310	165
Balance	..	...	....	...	...	..	+ 0.24	− 68	+ 28	+ 14	....	..	...	...
Third Experiment,‖ Wt. = 7.8 kg.														
Control 1/49	57	5.8	3.92	151	111	30	....	..	...	...	....	..	...	...
Post hemorrhage	19	1.4	3.50	135	108	17	0.31	13	54	34	....	..	...	...
15 hr. post hemorrhage	17	3.4	3.30	148	118	20	0.47	21	98	22	....	..	...	...
Totals/20 hr.	..	...	....	...	...	..	0.78	34	152	56	2.0	20	290	200
Net intake	..	...	....	...	...	..	....	..	...	...	1.5	19	220	150
Balance	..	...	....	...	...	..	+ 0.72	− 15	+ 68	+ 94	....	..	...	...

* Estimated by Na minus Cl plus 10 mEq., e. g., 149 minus 108 plus 10 equals 31.
† The solution infused was 0.9% NaCl, with 154 mEq. of Na and 154 mEq. of Cl per liter.
‡ Infusion minus intravascular fluid removed during exsanguination (red blood cells not included).
§ The composition of the solution was 150 mEq. of Na, 85 mEq. of Cl, and 65 mEq. of acetate per liter.
‖ The composition of the solution was 140 mEq. of Na, 10 mEq. of K, 100 mEq. of Cl, and 50 mEq. of acetate.

COMPOSITION OF BALANCED ELECTROLYTE SOLUTION

The composition of the balanced electrolyte solution as prepared for clinical studies is compared in Table 3 with normal human plasma [7] and other commonly used intravenous replacement solutions (sixth-molar sodium lactate,[8] Ringer's,[9] lactated Ringer's,[10] Darrow's,[11] and sodium chloride plus potassium chloride [12]). The sodium, calcium, magnesium, and chloride ions are present in their normal plasma concentrations.[7]

The remaining important anion, bicarbonate, is obtained chiefly from acetate which is very rapidly metabolized by the cells.[13] Acetate in the solution is preferred over bicarbonate because it yields a neutral pH and is easily sterilized by boiling or autoclaving. Acetate is preferred over lactate because of its more rapid metabolic conversion to bicarbonate in the body. Lactate ordinarily is used as the racemic mixture of d- and l- forms, and the relatively slow metabolism of the l- form [14] may possibly account for the not inconsiderable loss in the urine.[15] The small amount of citrate added to obtain some inhibition of clotting in the needle during slow infusions provides an additional source of base, so that bicarbonate in the form of precursors totaling 55 mEq. per liter is present in twice its normal plasma concentration.

Potassium is also present in twice its normal plasma concentration to expedite replenishment of intracellular losses. Consequently each liter of the solution provides an excess, above that needed to make up normal plasma or extracellular fluid, of 5 mEq. of potassium and 28 mEq. of available fixed base, i. e., sodium, potassium, calcium, or magnesium not present as chloride or other anions requiring removal via the kidneys. The fixed base is available to neutralize fixed acid radicals such as phosphate

4. Rosenthal, S. M., and Tabor, H.: Electrolyte Changes and Chemotherapy in Experimental Burn and Traumatic Shock and Hemorrhage, Arch. Surg. **51**: 244-252 (Nov.-Dec.) 1945.

5. Footnote 4. Rosenthal, S. M.: Experimental Chemotherapy of Burns and Shock: IV. Production of Traumatic Shock in Mice; V. Therapy with Mouse Serum and Sodium Salts, Pub. Health Rep. **58**: 1429-1436 (Sept. 24) 1943.

6. Footnote 4. Tabor, H., and Rosenthal, S. M.: Experimental Chemotherapy of Burns and Shock: Electrolyte Changes in Tourniquet Shock, Pub. Health Rep. **60**: 401-419 (April 13) 1945.

7. Gamble, J. L.: Chemical Anatomy, Physiology and Pathology of Extracellular Fluid: A Lecture Syllabus, ed. 5, Cambridge, Mass., Harvard University Press, 1947.

and sulfate. Because the tissue cells contain bicarbonate, correction of acidosis inside and outside the cells may be facilitated by supplying cells with a readily metabolized precursor of bicarbonate.

Calcium is included to aid in maintaining its normal plasma level, to counteract the inhibitory effect of potassium on the heart,[9] and to avoid the complications provoked by administering potassium during hypocalcemia.[16] It is also of value in avoiding hypocalcemic tetany per se, especially in patients with renal insufficiency, which is frequently associated with hypocalcemia and hypopotassemia.[17]

Magnesium is present to help maintain its normal plasma level and to prevent disturbances of neuromuscular function, especially tetany,[18] to replenish cell losses, and to assist in the activation of important intracellular enzymes, which requires optimum concentrations of this ion.

Furthermore, potassium, calcium, and magnesium ions and sodium acetate have been observed to induce a diuretic action[19]; their presence in the solution serves to enhance diuresis of excess water and to prevent lowering their plasma levels by dilution.

TABLE 2.—*Treatment of Acute Tourniquet Shock* in Mice with Balanced Electrolyte Solution† Containing 10 mEq. per Liter of Potassium*

	Controls	Treated
No. Mice	30	25
No. Died	29	1
Mortality, %	97	4

* Shock was produced by the two-hour application and release of bilateral tight tourniquets to the hind legs of mice as described by Rosenthal.[5]

† Treatment consisted of the intraperitoneal injection of 150 cc. per kilogram body weight of this solution; thus a 20 gm. mouse received 2 cc. one hour after removal of the tourniquets and 1 cc. four hours later. An additional group of 30 mice in shock received this electrolyte solution containing 5% of glucose. The presence of the glucose greatly retarded absorption of the fluid; only 6 of the mice survived and the peritoneal cavity of the dead mice contained a volume of fluid equal to that injected. The glucose electrolyte solution was then administered intravenously to a small group of mice in shock and all survived; successful intravenous treatment of mice in profound shock is technically difficult and was not further studied.

CLINICAL STUDIES

Because of its ionic similarity to plasma, balanced electrolyte solution in large infusions will expand the volume of plasma and extracellular fluid without distorting their ionic composition. The additional potassium and acetate are miscible with the vastly greater volume of intracellular fluid. Thus this solution differs markedly from 0.9% sodium chloride solution, Ringer's solution, or dextrose in water solutions, which of necessity exaggerate abnormalities in the composition of body fluids they are administered to replace.

The distortions caused by the 0.9% sodium chloride solution were demonstrated in patients who received 8,000 cc. of each solution postoperatively at eight day intervals. Comparisons of plasma concentrations show elevation of chloride and decrease in bicarbonate following infusion of 0.9% sodium chloride solution, but no significant changes following similar balanced electrolyte solution infusions. An example of such an experiment is shown in Table 4. Despite the similarity of potassium excretion after either infusion, balanced electrolyte solution, but not 0.9% sodium chloride solution, compensated for the potassium excreted.

Losses of intracellular potassium have been observed in numerous medical[20] and surgical disorders,[21] and hypopotassemia has been described frequently.[22] Inasmuch as major surgical procedures are followed by considerable excretion of potassium in the urine,[23] more complete replacement with balanced electrolyte solution was tried. A typical experience following a rather difficult subtotal gastrectomy is shown in Table 5. Although a negative potassium balance prevailed for the first few days postoperatively, hypopotassemia did not occur and a positive balance ensued. Experience with balanced electrolyte solution was obtained with a large group of surgical patients during a study of postoperative hypopotassemia and hyperpotassuria.[21b] The effects of the administration of the solution on the renal excretion of water and electrolytes following gastrectomy and similar major surgical procedures are shown in Table 6, which summarizes the average daily values in 18 patients.

It is apparent that adequate volumes of urine and large amounts of sodium and chloride were excreted, even in the first few days following operation. It is noteworthy that in all instances the concentration of sodium exceeded that of chloride.

The initial hyperpotassuria is apparent, but in the later days the daily excretion of potassium fell to below normal, suggesting the beginning of retention and cellular replenishment. It is important to contrast the high urinary excretion of sodium and chloride in these patients following infusion of balanced electrolyte solution with the low concentrations—usually with sodium lower than chloride—following administration of various mixtures of 0.9% sodium chloride solution and dextrose and water.[23b]

In the presence of impaired kidney function, solutions containing potassium should be used cautiously. The

8. Hartmann, A. F., and Senn, M. J. E.: Studies in Metabolism of Sodium *r*-Lactate: Response of Normal Human Subjects to Intravenous Injection of Sodium *r*-Lactate, J. Clin. Invest. **11**: 327-335 (March) 1932; Studies in Metabolism of Sodium *r*-Lactate: Response of Human Subjects with Acidosis to Intravenous Injection of Sodium *r*-Lactate, ibid. **11**: 337-344 (March) 1932; Studies in Metabolism of Sodium *r*-Lactate: Response of Human Subjects with Liver Damage, Disturbed Water and Mineral Balance, and Renal Insufficiency to Intravenous Injection of Sodium *r*-Lactate, ibid. **11**: 345-355 (March) 1932.

9. Ringer, S.: Concerning Influence Exerted by Each of Constituents of Blood on Contraction of Ventricle, J. Physiol. **3**: 380-393, 1880-82; Third Contribution Regarding Influence of Inorganic Constituents of Blood on Ventricular Contraction, ibid. **4**: 222-225, 1883; Further Contribution Regarding Influence of Different Constituents of Blood on Contraction of Heart, ibid. **4**: 29-42, 1883.

10. Hartmann, A. F.: Theory and Practice of Parenteral Fluid Administration, J. A. M. A. **103**: 1349-1354 (Nov. 3) 1934.

11. Govan, C. D., Jr., and Darrow, D. C.: Use of Potassium Chloride in Treatment of Dehydration of Diarrhea in Infants, J. Pediat. **28**: 541-549 (May) 1946.

12. Randall, H. T.; Habif, D. V.; Lockwood, J. S., and Werner, S. C.: Potassium Deficiency in Surgical Patients, Surgery **26**: 341-363 (Sept.) 1949. Randall, H. T.; Habif, D. V., and Lockwood, J. S.: Sodium Deficiency in Surgical Patients and Failure of Urine Chloride as Guide to Parenteral Therapy, ibid. **28**: 182-208 (Aug.) 1950.

13. Mudge, G. H.; Manning, J. A., and Gilman, A.: Sodium Acetate as a Source of Fixed Base, Proc. Soc. Exper. Biol. & Med. **71**: 136-138 (May) 1949.

14. Cori, C. F., and Cori, G. T.: Glycogen Formation in Liver from *d*- and *l*- Lactic Acid, J. Biol. Chem. **81**: 389-403 (Feb.) 1929.

15. Hartmann, A. F.; Perley, A. M.; Basman, J.; Nelson, M. V., and Asher, C.: Further Observations on Metabolism and Clinical Uses of Sodium Lactate, J. Pediat. **13**: 692-723 (Nov.) 1938.

16. Engel, F. L.; Martin, S. P., and Taylor, H.: On Relation of Potassium to Neurological Manifestations of Hypocalcemic Tetany, Bull. Johns Hopkins Hosp. **84**: 285-301 (April) 1949.

17. Sherry, S.; Eichna, L. W., and Earle, D. P., Jr.: Low Potassium Syndrome in Chronic Nephritis, J. Clin. Invest. **27**: 556 (July) 1948.

18. Hirschfeider, A. D., and Haury, V. D.: Clinical Manifestations of High and Low Plasma Magnesium: Dangers of Epsom Salt Purgation in Nephritis, J. A. M. A. **102**: 1138-1141 (April 7) 1934.

comparative safety of balanced electrolyte solutions is attested by numerous clinical trials in patients with renal insufficiency, oliguria, and uremia. One example is given in Table 7. After intravenous administration of large volumes of the solution to an elderly patient in uremia with vomiting, abdominal distention, and diarrhea, oliguria was changed to polyuria, acidosis was corrected, the blood urea nitrogen level was brought down to normal, and hypopotassemia gradually was overcome. Furthermore, no signs of pulmonary congestion or edema occurred, despite the massive infusion of both sodium and fluid.

The over-all clinical trials to be reported in detail elsewhere can be briefly summarized. Over 700 liters of balanced electrolyte solution, often containing 5% of dextrose, have been administered intravenously to patients at Flower and Fifth Avenue Hospitals after gastrectomy, abdominal-perineal resections, and other major surgical procedures. In the limited experience to date, the use of 3,000 cc. daily of this new solution seemed to prevent postoperative potassium deficiency as judged by plasma analyses and clinical observation, even though considerable potassuria occurred during the first postoperative days.[21b] Plasma concentrations of sodium, bicarbonate, and chloride were also adjusted and maintained close to normal.

Since it is not to be expected that this solution will provide sufficient potassium for the correction of preexisting massive deficiencies, higher concentrations can be obtained readily by addition of concentrated potassium acetate [24] to the solution. For example, in Table 7 the patient on several occasions required 25 to 100 mEq. of additional potassium acetate per day in the infusions. Potassium acetate is preferable to potassium chloride for intracellular replacement, since the problem of the disposal of the unwanted chloride ion is avoided.[25]

The urinary outputs (Table 6) have been unusually high despite the poor condition of many patients and the extensive surgical procedures performed. Postoperative salt and water retention did not occur. Edema, peripheral or pulmonary, has not been noted. After infusion of 3,000 cc. of balanced electrolyte solution preoperatively and postoperatively, significant chloride retention was not observed postoperatively; some patients retained less salt after operation than before. In contrast, Ariel [26] using infusions of 0.9% sodium chloride solution in this way found greater salt retention postoperatively.

In pediatric patients with acute diarrheal disease, diabetic or renal acidosis, or dehydration associated with acute infections, the use of 50 to 150 cc. per kilogram of body weight restored normal hydration, avoided hypopotassemia, and yielded normal plasma electrolyte values. Tetany and alkalosis did not occur. In extremely severe acidosis, sufficient evidence is not yet available to indicate whether sixth-molar sodium lactate can be dispensed with and sole reliance placed on balanced electrolyte solution to restore plasma bicarbonate and pH to normal.[27]

TABLE 3.—*Comparison of New Solution with Plasma and Other Replacement Solutions*

			All Concentrations in mEq./L.					
	Plasma [7]	Balanced Electrolyte Solution	0.9% NaCl	M/6 Sodium Lactate Solution [8]	U.S.P.* Ringer's Solution [9]	U.S.P.* Lactated Ringer's Solution [10]	Darrow's Solution [11]	NaCl Plus KCl [12]
Na^+	140	140	154	167	147	130	122	110
Cl^-	103	103	154	0	155.5	109	104	140
HCO_3^-	27	55 †	0	167 ‡	0	28 ‡	53 ‡	0
K^+	5	10	0	0	4	4	35	30
Ca^{++}	5	5	0	0	4.5	3	0	0
Mg^{++}	3	3	0	0	0	0	0	0

* U.S.P. formulas in general use are slightly different than the concentrations in footnotes 9 and 10.
† Obtained by metabolism of acetate 47 and citrate 8.
‡ Obtained by metabolism of racemic lactate.

TABLE 4.—*Comparison of Effects of Massive Infusions* of 0.9 Per Cent Sodium Chloride and Balanced Electrolyte Solution on Plasma and Urine Electrolytes*

		Plasma Concentrations, mEq./L.									
Time, Hr.		Na		Cl		HCO_3		K		Hematocrit, %	
NaCl†	BES‡	NaCl	BES	NaCl	BES	NaCl	BES	NaCl	BES	NaCl	BES
0	0	140	146	104	105	22	15	4.8	4.9	50	49
4	4	157	148	115	112	19	23	4.0	4.0	41	47
7§	11	150	154	120	108	13	22	4.5	4.3	42	40
24	22	150	150	106	108	20	29	4.0	4.0	49	50
		Urine Concentrations									
12	12	156	176	175	118	..	..	19	18	..	..

* Both infusions were 8,000 cc. and were given intravenously at the rate of 1,000 cc. per hour to a patient weighing 73 kg.
† NaCl = 0.9% sodium chloride solution, administered Oct. 2.
‡ BES = balanced electrolyte solution, administered Sept. 25.
§ Convulsive movements and facial edema observed.

Urologic patients frequently present reduced plasma sodium, together with acidosis, hypopotassemia, and varying degrees of renal insufficiency resulting from several types of urinary tract obstruction and disease. Clinical results such as those shown in Table 7 have been obtained. Although most of the patients were over 65 years of age, pulmonary edema did not occur.

19. Pfeiffer, C.; Robv, C., and Smith, R. B.: Diuretic Effect of Potassium, Calcium and Magnesium Given Orally in Salt Solution, Am. J. Physiol. **134:** 729-732 (Nov.) 1941. McCance, R. A., and Widdowson, E. M.: Fate of Calcium and Magnesium After Intravenous Administration to Normal Persons, Biochem. J. **33:** 523-529 (April) 1939. Fox and McCune.[24a]

20. (*a*) Holler, J. W.: Potassium Deficiency Occurring During Treatment of Diabetic Acidosis, J. A. M. A. **131:** 1186-1189 (Aug. 10) 1946. (*b*) Danowski, T. S.: Newer Concepts of Role of Potassium in Disease, Am. J. Med. **7:** 525-531 (Oct.) 1949.

21. (*a*) Wilkinson, A. W.; Billing, B. H.; Nagy, G., and Stewart, C. P.: Excretion of Potassium After Partial Gastrectomy, Lancet **2:** 135-137 (July 22) 1950. (*b*) Winfield, J. M.; Fox, C. L., Jr., and Mersheimer, W. L.: Etiological Factors in Postoperative Salt Retention and Its Prevention, Ann. Surg. **134:** 626-635 (Oct.) 1951.

22. Footnote 12. Danowski.[20b]

23. (*a*) Wilkinson, Billing, Nagy, and Stewart.[23a] (*b*) Elman, R.; Lemmer, R. A.; Weichselbaum, T. E.; Owen, J. G., and Yore, R. W.: Minimum Postoperative Maintenance Requirements for Parenteral Water, Sodium, Potassium, Chloride and Glucose, Ann. Surg. **130:** 703-722 (Oct.) 1949.

24. Sterile 10 cc. ampules containing 5 mEq. per cubic centimeter of potassium acetate were supplied by the Cutter Laboratories; addition of 5 cc. to 1 liter of balanced electrolyte solution raises the concentration of potassium to 35 mEq. per liter.

In a series of patients undergoing multiple orthopedic surgical procedures, 2 to 4 liters have been used for one or more days preoperatively and postoperatively. Normal fluid and electrolyte balances were obtained with minimal laboratory control. It may be noteworthy that the patients who received supplementary oral fluids excreted urine with much lower concentrations of electrolytes than the surgical patients represented in Table 6.

In all, approximately 100 patients have each received 3 to 25 liters of this solution. No signs of potassium toxicity, tetany, or metabolic alkalosis have been observed. Elevated plasma carbon dioxide values have been obtained occasionally, the maximum value being shown in Table 7. In this connection it is of interest that the potential bicarbonate concentration of this solution is similar to that recommended by Darrow [11] (Table 3).

COMMENT

Van Slyke [28] has referred to 0.9% sodium chloride solution as "unphysiological saline," since it contains 50% more chloride than the plasma. Infusions of saline solution distort the composition of body fluids to some degree and provide no available fixed base until renal activity removes the chloride as ammonium or potassium chloride [12] (unless the chloride ion enters cells [29]). For these reasons the use of 0.9% sodium chloride solution may well be responsible for some of the difficulties and translocations in postoperative fluid therapy described by Coller, Moyer,[30] and others.[31] A further clue is their preference for a 0.5 to 0.6% solution of sodium chloride, which provides chloride ion in normal plasma or extracellular fluid concentrations. The fact that such solutions are markedly hypotonic with respect to sodium (Na=85 to 102 mEq. per liter) may account in part for the low plasma sodium values discernible in their patients.[30a] Additional clues are Wilde's [29] experiments indicating a shift of chloride into muscles deficient in potassium and the finding of excess chloride in potassium-depleted muscles obtained at autopsy from children with the nephrotic syndrome.[32]

Inclusion of calcium, magnesium, and potassium in the solution sustains the plasma levels of these ions and takes advantage of their diuretic action. The copious urinary outputs observed may represent the renal response to one or more of these ions or to the expansion of plasma and extracellular volume without ionic distortion. The enhancement of renal tubular transport by acetate [33] may also be a factor. Detailed studies of these effects are needed. The role in renal function of excess bicarbonate and of the other factors mentioned in designing balanced electrolyte solution has been reviewed by Pitts [34] and Wolf [35] and applied clinically by Fox and McCune (Table 7).

In some of our hemorrhage experiments [1] and in at least one published study of diabetic acidosis,[36] the urine data suggested that, after administration of 0.9% sodium chloride solution, subsequent potassuria might represent an attempt by the body to excrete the excess of infused chloride without sodium; frequently the urine chloride equaled the sum of sodium plus potassium excreted. Likewise, when sodium chloride solutions are supplemented with potassium chloride,[12] a similar trend to excessive potassium excretion is discernible. The poten-

TABLE 5.—*Example of Postoperative Therapy with Balanced Electrolyte Solution After Subtotal Gastrectomy in Patient Aged Fifty-Five*

Postoperative Day	Therapy, L.	Plasma K (mEq./L.)	Daily Urine Output						
			Volume, L.	Creatinine, Gm.	Total mEq. Na	Total mEq. Cl	Total mEq. K	N, Gm.	K/N
Preoperative	.....	5.04	....	...	...	...	...	....	...
1 & 2 (48 hr.)	Blood, 1	....	....	...	...	...	...	....	...
	D/H$_2$O, 1	....	1.96	4.3	314	180	171	27.8	6.2 †
	BES,* 4	....	....	...	...	...	...	....	...
3	BES,* 3	4.6	1.25	2.3	325	190	80	12.9	6.1
4	BES,* 2	....	1.03	1.9	262	151	45	13.6	3.3
5	Oral milk, etc.	4.0	1.55	2.0	304	244	32	16.3	1.9
6	Oral milk, etc.	....	0.7	1.7	81	58	20	12.2	1.6
7	Oral milk, etc.	....	0.9	2.0	100	83	28	15.6	1.8
8	Oral milk, etc.	5.12	1.0	1.8	132	121	35	15.3	2.3

* The balanced electrolyte solution (BES) used contained 5% dextrose.
† The K/N ratio in the first 18 hours postoperatively has usually exceeded 10, indicating a disproportionately greater loss of K.

TABLE 6.—*Composition of the Urine* Following Postoperative Administration of Balanced Electrolyte Solution*

	Day of Operation †	Postoperative Days ‡				
		1	2	3	4	5
Urine vol., cc.	1,060	1,500	1,510	1,500	1,470	1,320
Sodium, mEq.	188	237	212	202	228	270
Chloride, mEq.	160	190	182	177	166	215
Potassium, mEq.	88	75	48	33	25	23

* Values are averages of total milliequivalents per day voided by 18 patients who received 2,000 to 3,000 cc. daily of balanced electrolyte solution after gastrectomy, abdominal-perineal resection, or other major operations. Data of eight different cases have been published.[31b]
† The interval from the end of operation to the next morning ranged from 10 to 20 hours.
‡ These are 24-hour collections.

25. Recent studies (Gamble, J. L., and others: Effects of Large Loads of Electrolytes, Pediatrics **7**: 305 [March] 1951) "suggest that KCl is not a suitable salt to use for replacement of loss of intracellular fluid incurred by dehydrating processes."

26. Ariel, I. M., and Kremen, A. J.: Compartmental Distribution of Sodium Chloride in Surgical Patients Pre- and Postoperatively, Ann. Surg. **132**: 1009-1026 (Dec.) 1950.

27. Hartmann, A. F.: Treatment of Severe Diabetic Acidosis: Comparison of Methods, with Particular Reference to Use of Racemic Sodium Lactate, Arch. Int. Med. **56**: 413-434 (Sept.) 1935.

28. Van Slyke, D. D.: Effects of Shock on Kidney, Ann. Int. Med. **28**: 701-722 (April) 1948.

29. Wilde, W. S.: Chloride Equilibrium in Muscle, Am. J. Physiol. **143**: 666-676 (May) 1945.

30. (*a*) Coller, F. A.; Campbell, K. N.; Vaughan, H. H.; Iob, L. V., and Moyer, Carl A.: Postoperative Salt Intolerance, Ann. Surg. **119**: 533-542 (April) 1944. (*b*) Coller, F. A.; Vaughan, H. H.; Kalder, N. B., and Moyer, C. A.: Translocation of Fluid Produced by Intravenous Administration of Isotonic Salt Solutions in Man Postoperatively, ibid. **122**: 663-677 (Oct.) 1945.

31. Johnson, H. T.; Conn, J. W.; Iob, L. V., and Coller, F. A.: Postoperative Salt Retention and Its Relation to Increased Adrenal Cortical Function, Ann. Surg. **132**: 374-385 (Sept.) 1950.

tial usefulness of balanced electrolyte solution in the treatment of diabetic acidosis can be indicated by reviewing Holler's case report of potassium deficiency with paralysis.[20a] Had this patient received infusions of balanced electrolyte solution equal to the large amounts of sodium chloride and sodium lactate solutions administered, the potassium intake would automatically have approximated that ultimately given to overcome the symptoms of potassium deficiency which followed the initial infusions of sodium salts only.

To replace the losses that occur in diarrheal disease, Darrow introduced the use of larger amounts of potassium in replacement solutions.[37] Subsequent studies emphasized that the recommended solution, containing 35 mEq. per liter of potassium, imposed the hazard of potassium toxicity,[38] and Darrow has advocated that most of the required potassium be replaced by oral therapy after the acute episode.[39] This hazard is avoided with balanced electrolyte solution which permits early administration of potassium and prevents hypopotassemia resulting from dilution of extracellular fluid with saline, lactate, or other non-potassium-containing solutions. Some of the difficulties of regulating potassium therapy by the electrocardiogram have been described.[40]

Extensive laboratory and clinical studies have shown that, in numerous fluid and electrolyte problems in medicine and surgery, replacement of extracellular fluid with its quota of available free base is of primary importance.[41] To approximate extracellular fluid, a mixture of two-thirds 0.9% sodium chloride solution and one-third sixth-molar sodium lactate solution was advised in the treatment of severe burns after the initial sodium loss and acidosis had been corrected with sixth-molar sodium lactate.[42] This mixture was subsequently recommended for use either by mouth or parenterally in the treatment of burn shock by the Subcommittee on Shock of the National Research Council,[43] and more recently a similar solution with sodium bicarbonate, administered by mouth, has been advocated for the emergency treatment of burn shock by the Surgical Study Section of the Public Health Service.[44] It is noteworthy that, unlike 0.9% sodium chloride solution alone, these more physiological combinations provide for an excess of free base roughly twice that normally found in plasma and equal to that present in balanced electrolyte solution.

Solutions similar to balanced electrolyte solution were proposed many years ago by Ringer [9] and Hartmann,[10] but they have not been used as extensively as isotonic sodium chloride solution. Obviously 0.9% sodium chloride solution is the simplest solution to prepare, and some surgeons have found it efficacious.[45] There is now much evidence that it is not the best solution for replacement or supportive therapy. Its lack of both potassium and available base seems to be a serious deficiency, especially when large volumes of solution are required. Further-

TABLE 7.—*Prolonged Use of Balanced Electrolyte Solution and Supplementary Potassium Acetate in Elderly Uremic Patient with Prolonged Vomiting and Diarrhea*

	Blood		Plasma					Urine Output *			Intravenous Intake †			
				mEq./L.					Total mEq.			Total mEq.		
Date	Urea N, Mg./100 Cc.	Hematocrit, %	Protein, Gm./100 Cc.	Na	Cl	CO_2	K	Vol., Cc.	Na	K	Vol., Cc.	Na	Cl	K
11/18	83	47	8.5	150	100	19	3.05	500	5	..	2,200	0	0	0
11/20 ‡	137	50	8.0	136	90	22	4.7	700	11	56	3,000	73	73	0
	..	60	...	125	89	22	3.5	500	..	..	.....	0	0	0
Therapy with BES Begun														
11/21	..	..	...	....	....	..	....	4,900	55	120	3,100	420	315	30
11/22	..	..	...	....	....	..	3.0	.....	..	..	2,000	280	210	20
11/23	..	..	...	....	....	..	....	.....	..	..	3,000	420	315	30
11/24	81	..	...	160	....	..	3.2	1,000	6	37	3,700	280	210	48
11/25	74	41	7.0	162	101	37	....	1,000	44	72	2,900	140	105	58
11/26	46	..	...	....	105	36	....	1,270	72	83	3,500	140	105	40
11/27	..	..	...	155	....	..	2.75	1,050	83	38	2,700	210	158	95
11/28	..	..	...	151	....	..	2.95	1,300	135	34	3,000	280	210	45
11/29	..	..	...	151	....	..	2.95	.....	..	..	2,500	280	210	20
11/30	..	..	...	150	....	..	2.85	.....	..	..	2,400	140	105	35
12/1	13	37	6.0	146	109	24	3.05	1,100	104	33	1,650	140	105	35
12/2	..	..	...	137	....	..	....	.....	..	..	3,100	420	315	30
12/3	..	..	...	....	....	..	....	.....	..	..	3,500	140	105	35
12/4	26	..	...	140	....	..	3.1	.....	..	..	4,000	420	315	70
12/5	..	..	...	147	....	..	3.1	.....	..	..	4,000	420	315	80
12/6	..	..	...	....	....	..	....	1,280	170	22	3,000	280	210	70
12/7	..	..	...	....	....	..	....	.....	..	..	.....	....	....	..
12/8	13	..	...	139	104	23	....	.....	..	..	.....	....	....	..

* Output data do not include large losses of 100 to 5,000 cc. via nasogastric and Miller-Abbott tubes for many days. Note the adequate urine output and constantly decreasing blood urea nitrogen level achieved with rising plasma levels of sodium and bicarbonate (Fox, C. L., Jr., and McCune, D. J.: Electrolyte Changes in Nephrosis: Occurrence of Diuresis Following Administration of Sodium and Potassium Salts, Am. J. M. Sc. **216**: 1-10 [July] 1948).

† Some dextrose and water was given at times, hence fluid intakes are greater than corresponding electrolyte intakes.

‡ First line, a.m.; second line, p.m.

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more, the absence of both calcium and magnesium is not desirable.

Further study is necessary, but examination of Table 3 suggests the logic of using a solution patterned after plasma; our present experience indicates the additional usefulness of supplementary available fixed base and potassium.

At a time when blood substitutes are in short supply, it would seem advisable to study carefully a solution that simulates plasma and extracellular fluid much more closely than 0.9% sodium chloride solution or dextrose in water.

SUMMARY AND CONCLUSIONS

A physiological electrolyte replacement solution which contains sodium, calcium, magnesium, and chloride ions in the normal plasma concentrations is described. Its potassium concentration of 10 mEq. per liter is twice the normal plasma value; likewise, bicarbonate is provided in twice its plasma concentration in the form of rapidly metabolizable precursors, acetate and citrate. The rationale for the use of this solution with available free base and potassium is presented.

In managing the electrolyte and fluid therapy of surgical, pediatric, orthopedic, and urologic patients who lose intracellular potassium after extensive operative procedures or disease, substitution of this solution for 0.9% sodium chloride solution or other solutions has restored acid-base balance and prevented the occurrence of hypopotassemia. The physiological ratio of sodium to chloride and the available free base in this new solution prevent chloride and fluid dislocations, thus avoiding postoperative oliguria and sodium chloride retention.

Experimental and clinical data indicate that this single physiological solution prevents postoperative hypopotassemia without danger of toxicity, corrects moderate acidosis without inducing alkalosis, replaces the electrolytes in extracellular fluid, and induces copious secretion of urine and salt.

The solution is readily available for trials by others, who may thereby discover improvements (e. g., that the potassium concentration can be raised without incurring toxicity) and perhaps confirm our impression that elimination of 0.9% sodium chloride solution and other "unphysiological" solutions now in general use will greatly simplify and improve fluid and electrolyte therapy and thereby prevent the development of electrolyte abnormalities, iatrogenic or otherwise.

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PSYCHOLOGICAL PROBLEMS OF ADJUSTMENT TO CANCER OF THE BREAST

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This paper is the result of a joint investigation by a group of psychoanalysts and surgeons, headed by Dr. Catherine Bacon of the Chicago Institute for Psychoanalysis and Dr. Max Cutler of the Chicago Tumor Institute. Our problem was an exploratory study of the possible psychosomatic aspects of cancer of the breast. The results of this research will be published in a subsequent joint communication. One of us (R. R.) was particularly impressed by the surgeon's interest in the problem of how, why, when, and what to tell the patient with breast carcinoma. The problem was sharply focused during observation of the emotional reactions of 50 women operated on by one of us (M. C.) to the handling by their referring or staff physicians. Our paper is an outgrowth of this analyst's observations and incorporates within it the surgeon's practical experience in the correct, intuitive emotional management of his many cancer patients in the past.

In the development of almost every field of science a periodic point is reached at which that particular group is not currently integrating or utilizing its total research advancements or parallel ones in auxiliary fields. The time lag is costly to both physician and patient. This inertia is due to the slow recognition, absorption, and integration of advances from widely scattered sources of research. It is also augmented within the medical profession by the isolation of specialist groups from one another. This contributes to a focal, rather than a total, view of an existing problem. Thus, two detached bodies —surgeons and psychoanalysts—can work within the same hospital, but because of the narrowness of their specialties fail to interchange valuable pieces of new or even old knowledge. We feel that such a state of inertia exists in the psychological handling of women with breast cancer and that here is a situation with potentially severe emotional trauma that is being sadly mismanaged and misunderstood by a good percentage of the medical profession.

It is our purpose to correlate the status of current surgical treatment of cancer of the breast with applicable psychoanalytic knowledge of behavior. This approach is directed toward a logical viewing of our patient as a total personality invaded by a malignant disease process. We are concerned with the psychological meaning of the

breast and an understanding of the range of emotional shock associated with breast destruction. Our interest is also centered in the surgeon's significant role in his patient's life and in the emotional impact of the cancer upon the surgeon. We hope to gain some appreciation of the psychological interaction between patient and surgeon, and as an outgrowth of this to propose a general method for the emotional management of women with breast cancers.

The problems are best approached through a basic exploration of the dual psychological conflict confronting a woman with breast cancer: (1) adjustment to breast mutilation, and (2) adjustment to invasion by a potentially deadly disease.

ADJUSTMENT TO BREAST MUTILATION

Postmastectomy depression was noted as a frequent reaction in the group we studied. This is a more or less common sequel to mastectomy and is marked by anxiety, insomnia, depressive attitudes, occasional ideas of suicide, and feelings of shame and worthlessness. The depression is characterized by its emotional similarity to mourning. One can say that these women mourn the loss of their breast. They are concerned with what their husbands, or men in general, will think of them in their new mutilated state. Feminine pride has been severely damaged. They are faced with the problem of changing the mind's picture of their body image to one with a unilateral breast, or perhaps none at all.

We can better understand something of the background of this depressive reaction if we consider the emotional meaning of the breast within a woman's total personality. Breasts are among her most prized physical possessions. They have two major psychological meanings. First of all, in our culture, breasts have a particular sexual significance. They are glamorized in magazines, street car ads, and the movies. Women and men have been made more and more breast conscious. In fact, when we examine the situation critically we see that the breasts are the only positive evidence of femaleness. The reproductive organs are internal, and the pubic area is smooth and concealed. Remove a woman's breasts and she has lost her badge of femininity. Psychologically it has the same qualitative meaning as loss of the penis in man. This is often demonstrated in dreams and neurotic symptomatology wherein both men and women tend to equate the penis with the breast.

The other major meaning of the breast lies in its function as a milk-bearing organ. It is equated with something that is uniquely female—the role of a mother. In our culture this has become superficially less important, since fewer mothers pride themselves on their ability to breast feed. This is, however, emotionally misleading, since there remains an unshakable and universally unconscious symbolic connection between the breast and motherhood. The breast, therefore, is the emotional symbol of the woman's pride in her sexuality and in her motherliness. To threaten the breast is to shake the very core of her feminine orientation.

The surgeon has to be acutely aware of these dual meanings of the breast. He must understand that the primary emotional reaction connected with disease of the breast usually is not a fear of cancer or death, but is rather the shocking feeling that the basic feminine role is in danger. This frequently results in "ostrich-like" behavior, through which the woman postpones going to her doctor about the discovered lump. The original emotional trauma, then, most often occurs on the level of the woman's realization that her femininity is endangered. It is, of course, immediately mixed with the concept of cancer and its potential threat to life, but this does not emerge as the central problem of adjustment until later, after she has become accustomed to the inevitability of mutilation and managed to attain some sort of psychological adjustment to her new physical self. Her first problem is that of protecting her breast; only later does she begin protecting her life. It is obvious that the surgeon cannot wait for this transition to occur, but must bear in mind that the emotional focus is different in the preoperative and postoperative periods than in the latter convalescent and radiation-therapy phases, when the threat to life becomes the struggle.

Is there any way in which he can gage the intensity of this initial reaction? We believe that there is.

PSYCHOLOGICAL MANAGEMENT

Women exhibit wide variations in conscious attitudes to their breasts, ranging from extreme pride through indifference to excessive shame. These emotional reactions are partially conditioned by the actual physical appearance of the breasts, whether they are well-shaped or unsightly, but primarily they stem from deep psychological attitudes of acceptance or denial of the fundamental feminine role, i. e., sex and motherhood.

The mature woman accepts her breasts, good or bad, with a proportionate amount of pride and utilizes them to their best cosmetic and sexual advantage. She does not feel attitudes of indifference or shame. Later in life —after successful marriage, motherhood, and the climacteric—her breasts have less dynamic significance. She then has other evidence of her prowess, i. e., a husband and children, and is more ready to accept a future in which little emphasis is placed on the sexual and maternal role of her breasts. We can say that they have served their purpose and she is now ready to accept their retirement. Her feelings over loss of a breast at this later age are as proportionately different as the degree of mourning one would expect over the death of a husband in his prime or after his late retirement from an active, full, and accomplished life.

The climacteric period is a time when old problems over femininity may once more emerge. She also is normally confronted with the problem of adjusting to cessation of fertility. Some women feel that the menopause will rob them of their sexual allure. Loss of the breast, therefore, in this phase of life increases the problem of adjustment. Again the difficulty is less in women with a history of successful feminine functioning as previously outlined.

We deduce from this that in the emotionally mature woman the greatest trauma from cancer and breast amputation occurs during the preclimacteric and climacteric periods, when it threatens the fulfillment of her optimal feminine functioning. The trauma tends to be greater in

direct proportion to her comparative youth and to the degree of feminine achievement that she feels she has not attained (i. e., sexuality, husband, and children). According to this rough equation we expect the strongest reactions in young women still in the childbearing age and the mildest in older postclimacteric women with husbands and children. The degree varies inversely in the younger women according to whether they are married and have children. In the normal older women we anticipate that the chief problem will be adjustment to cancer and the possibility of death, whereas in the younger group it will be more of an immediate mixture of the two conflicts as previously outlined. We understand that there are many exceptions even within the so-called emotionally mature, normal group, and we offer this explanation only as a general "rule of thumb," not to be rigidly applied to every patient.

The neurotic woman, on the other hand, presents different problems—there has been a disturbance in the development of her sexuality. She is unable to accept her femininity completely or has strong doubts about her feminine abilities. Sexuality has become fused with guilt or hostility and thus has been rejected as a part of her "normal" functioning. Such a woman develops neurotic character patterns in order to solve this dilemma. She is masculine, frigid, or perhaps superficially sexual in an exaggerated fashion. In the former case she might develop attitudes of indifference or shame toward her breasts, whereas in the latter one might expect an excessive pride and overevaluation of the breasts.

Thus these women, through investing their breasts with irrational, disproportionate pride and shame, have made them the external focus for an internal conflict. A mutilating procedure involving this organ reawakens and intensifies the underlying neurosis.

In our series of cases the postmastectomy depressions were most extreme in women who had invested excessive feeling in their breasts. Underlying this reaction in these women was an exacerbation of their deeper neurotic conflicts. The surgeon should pay attention to such strong positive or negative breast complexes, and be alert for subsequent acute neurotic outbursts. It might be advisable to enlist the temporary assistance of a psychiatrist if he feels that such a reaction is liable to occur.

The physician's management is dependent on his constant awareness of these normal and abnormal breast reactions. In the preclimacteric and climacteric groups, he is particularly understanding of and sympathetic with the woman's feelings of danger and loss. He should not be too direct, hasty, or unfeeling in his approach. He must take time to discuss the problem thoroughly and to be an attentive listener. He sympathizes with her anxiety and dread over the prospect of losing the breast. He reveals his understanding of the emotional meaning and importance of the breast and clearly defines the necessity for the surgical step. The woman is not left with a feeling that the discussion was cold and mechanical. This enables her to view the surgeon as an understanding figure who regrets the urgent necessity for removal of the breast. Most important of all, it represents the beginning of a sound therapeutic relationship. The surgeon has been known sometimes to disregard her feelings callously and thus to lose her therapeutic cooperation. She then views him only as an unfeeling technician who coldly takes from her an emotionally prized organ. One method of easing acceptance of amputation is to indoctrinate the woman preoperatively with the concept of her breast as a danger to her future. This causes a shift in thinking away from the breast as a prized possession toward viewing it as a foreign body that threatens life.

Any past feminine achievements—husband and children—should be introduced into the discussion to offset her sense of loss. The husband's aid has to be enlisted privately, so that he can be impressed with the importance of his role preoperatively and postoperatively. He should be instructed to be particularly tender, loving, and attentive during these phases. He should play up her other feminine charms through hospital gifts of clothes, cosmetics, and other items calculated to refocus her attention on still-present points for feminine pride. He should offer helpful sympathy, yet direct attention to the really important factor, that of the preservation of their relationship through the necessary medium of preserving her life by surgery. He should state clearly and repeat many times that the loss of the breast does not alter his love for her. We observed in many women that particular postoperative anxiety centered around a fear of the husband's rejection of her mutilated state. This developing anxiety can be aborted by the husband's prophylactic reassurance. Early in the postoperative phase the doctor should arrange for a woman to discuss prosthetics with the patient. Since people have become conditioned to advertising, it is well to borrow advertising techniques. A series of before and after pictures, with and without the breast prosthetic, is particularly helpful. Ideally this should be accomplished in the hospital, so that the woman can leave for home with the feeling that she is almost as intact physically as at the time of her admission. The woman's attention is thereby directed toward the goal of prompt healing. The husband is urged to express active interest in the state of the woman's operative wound. It must be stressed to him that he has to condition himself to accept the sight of the woman's nude body casually. He should treat it as part of their normal life. She thereby avoids the pitfall of concealing the chest from her husband. This concealment and denial of breast removal, because of the husband's imagined sensitivity, makes it impossible for her to accept the postoperative status of the body.

We do not mean to imply that the husband is supposed to enjoy the sight of the scar; obviously this is absurd. He should not, however, give his wife the impression that he never wants to see the scar. She is no more anxious to show it to him than he is to see it, but she has to have the feeling that he has accepted its presence and can, in the natural process of living together, view it without shock.

Some husbands have neurotic reactions to this viewing. These are the ones who deliberately avoid any sight of the operative incision and thus force their wife into a pattern of anxious concealment. Ideally each husband should be told in advance something of the difference between these possible normal and abnormal reactions

on his part. He should be impressed with the importance of his role in his wife's postoperative adjustment and the future of the marriage in general. His aid is enlisted in reporting to the surgeon any such strong continued pattern of avoidance within himself. He is made to understand that his normal reaction to the sight of the operative wound or incision will contain elements of shock, disappointment, anxiety, and sorrow. This is the same feeling that his wife will experience, and it is important that they share it together. Sharing her sorrow helps her to work through it more quickly. Crying on the part of the patient should be allowed. Do not try to stop it; it will make her feel better.

Furthermore, just as the husband must be warned regarding the normal and abnormal components of his feelings about her wound, so also the woman must be prepared to understand these reactions in her husband. A woman social worker can be of the utmost value in the management of many of these details and the ones already enumerated in regard to adjustment to mutilation of the breast.

The surgeon understands, therefore, that he is to anticipate more anxiety in women in the preclimacteric and climacteric periods and less in the postclimacteric woman as a reaction to the threatened breast amputation. If this ratio is reversed, he should realize that he is dealing with a neurotic patient. This should be a warning to him that he must be particularly careful in the management of such women. Ideally he makes an effort to evaluate the meaning and intensity of this reaction. He spends more time with them or perhaps calls a psychiatrist into consultation. Certainly he is alerted to the possibility that the postoperative emotional course will be a difficult one for the woman. This preoperative sensitivity will pay dividends in patient cooperation [1] and might well undercut or shorten a severe postoperative depressive reaction.

REACTION TO INVASION BY A POTENTIALLY DEADLY DISEASE

The problem of what and how much to tell the patient with breast cancer has almost as many answers as there are surgeons. Each doctor tends to work out a method according to his own feeling or lack of feeling about the problem. We believe that this results in hit-and-miss methods which often cause unnecessary emotional trauma to the patient. The common denominators in these miscellaneous approaches revolve around techniques of grave concealment or giving misleading partial information accompanied by an attempt at reassurance.

Every woman in our series immediately on discovering a lump in her breast or shortly thereafter associated it with cancer and the prospect of mutilation and possible death. Our cancer propaganda through the press, radio, films, and word of mouth has served its purpose. It is true that many of the women were afraid to face the reality implications of cancer of the breast and so put off seeing their physicians, but the fact remains that the idea of cancer was nonetheless firmly implanted within their minds. The woman with the breast lump, therefore, even before she fearfully visits her doctor, has already anxiously confronted herself 100 times over with the word cancer. This is her frame of reference. The physician commonly confirms the lump and tells her that it is a tumor and that a biopsy will determine whether it is "serious" or "malignant." The latter word is used less often. Rarely is the term cancer used, and usually only if the patient does so. Even on such occasions the tendency is to ignore what she has said and to continue using vague terms. The woman rapidly stops "talking cancer" but never stops "thinking cancer." She reacts to the surgeon's avoidance of the word cancer as evidence of his feeling that the diagnosis is equivalent to a death sentence. This idea that the surgeon is also afraid of the disease increases her fear and serves as a confirmation of the unverbalized thought that she is doomed. Postoperatively, she may or may not be told the truth. Some surgeons are guided by whether or not the patient asks. Unfortunately, many patients do not ask. They believe it is cancer and feel that, since the surgeon does not talk about it spontaneously, the answer must be that he feels that they are going to die and does not wish to have to say so or to lie about it. They suffer in silence. By this time the husband has been informed of the diagnosis and, impressed with the surgeon's secrecy, may or may not tell his wife the truth. He gets the feeling that, if she were to be told, the surgeon would have done so. The woman senses from his forced attitude that something is radically wrong. She adds his evasiveness to the surgeon's silence as further evidence of impending doom. She too begins to play the game. She has been forced along with the others into the artificial role of actor. All playing the grim game of "It wasn't cancer. Everything is going to be all right. What a relief!" Usually she is left with the simple knowledge that she had cancer and probably still does; subsequently, when postoperative radiation is begun, she feels convinced.

This role of concealment on the part of the surgeon has the unfortunate consequence of removing him as a possible source of emotional aid. It also interferes seriously with the patient's cooperation in her postoperative treatment. She has a feeling of "What's the use?" and also of not completely trusting her doctor. The role of concealment on the part of the patient demands valuable energy for execution and represents an unnecessarily fatiguing and painful process.

Ideally, the surgeon should ask in the very beginning of the first interview, during the history taking and before the physical examination, whether or not the patient has been worried about the possibility of cancer. This touches on a common problem and at least brings the fear out into the open. The patient then finds it easier to relate herself to the physician and ventilate some of her anxiety. They should be prepared for biopsy and potential mastectomy. This preparation consists of a careful, considerate discussion of the biopsy and the chances of mastectomy. The possibility of radical surgery should not be underplayed, since it is to the patient's advantage to be warned and to have the brief preoperative period in which to begin adjustment to the prospect of cancer and mutilation. Too often the patient with cancer of the

1. Cockerill, E. E.: The Patient Has Cancer, Pub. Health Nursing 35: 552-558 (Oct.) 1943.

breast is misled and then awakens with the shocking realization of amputation. This undermines her confidence in the surgeon and generates hostility, which interferes with their future relationship.

Some surgeons have said: "Talk about cancer! I'd have to lock the windows first." This attitude reflects a deep and chronic anxiety on the surgeon's part regarding his ability to handle the patient's emotional reaction to cancer. It is obviously predicated on his irrational belief that cancer of the breast is fatal and that the woman would kill herself because of the knowledge. A person trapped on a high cliff by a charging lion might well leap to death as an alternative to a hopeless and painful situation. But suppose that person is reminded that he has a highpowered rifle in his hands. Who is going to commit suicide with a 50-50 chance of survival? The rifles in our case are facts about modern therapeutic techniques and the resulting prognosis. It is possible, of course, that a severely neurotic person might utilize this irrationally as reason for a suicidal attempt. Suicide could also be precipitated by threatened loss of a job or a love partner, or by a change in the weather. It is necessary, therefore, for the surgeon to examine his patient's emotional reactions during the physical examination and history taking. It doesn't take a skilled psychiatrist to spot a badly disorganized person or one who is already severely depressed. Such a patient must be handled more cautiously and dealt with only when the surgeon feels certain about the degree of the neurosis. Psychiatric consultation would be most helpful. The important point is that the average woman with cancer of the breast should not be allowed to suffer from emotional mismanagement because of the potential reaction of a rare seriously disorganized patient with the same illness.

We believe that this generalized, undifferentiated "kid gloves" attitude on the part of the surgeon stems from genuine anxiety over the welfare of the patient. It represents an outdated attitude, a carry-over from the real problems that confronted the physician of several generations ago. Cancer of the breast then equaled death —there was no alternative. This concept has been handed down from generation to generation as an essential piece of bedside technique. The conditions that created the attitude have ceased to exist; yet we automatically continue the attitude. This results in communicating to our patients the feeling that the conditions must also still exist.

Approximately 17,000 women die in the United States each year of cancer of the breast. There are about 70,000 cases under observation in the United States at any given time. The highest incidence of breast cancer is between the ages of 40 and 50, about 75% occurring after the age of 40. There is an increasing susceptibility with advancing years. There is some evidence to indicate that mammary cancer is commoner in single than in married women and also that among married women with mammary cancer there is a lower percentage who have borne children or who have nursed them. This disease is commoner among women who have or who have had benign epithelial tumors. Cancer of the breast is commoner in women with a family history of the disease. The average duration of life is four years. The prognosis is definitely poorer in women under 40 and especially under 30 years of age. Pregnancy and lactation exert an unfavorable influence.

The extent of the disease when treatment is begun is the most important factor influencing prognosis. Both the incidence and the number of deaths from mammary cancer seem to be increasing. Between 30 and 35% of patients survive five years after radical surgery, the curability being about 80% when the disease is confined to the breast and about 40% when the axillary nodes are invaded. Radical mastectomy followed by postoperative radiation in selected cases is the generally accepted procedure for presumably operable cases.

In our study every woman seen by the psychiatrist was told by the interviewer that he did not know whether she had originally come to the Tumor Institute because of cancer of the breast. He knew only that she had some disease of the breast, and he was interested in talking with her about her reaction to it. The word cancer was freely used by the interviewer throughout the sessions. The responses elicited were dramatic: A few women were so relieved to hear someone say cancer that, like children with a new word, they said it again and again. All appeared to accept it with relief. About half were found to be living in a world in which people around them studiously avoided using the word cancer. All were asked if they had inquired of their surgeon as to whether they had cancer, and if they had not, why not. For the most part, those who had failed to ask had interpreted the surgeon's silence as has been previously outlined. A recent statistical study by Kelly and Friesen [2] showed that 89 of 100 patients with cancer of various organs and 729 of 740 patients over 45 years of age undergoing yearly examinations in an effort to detect cancer in an early stage wanted to be told of the presence of cancer.

All the women with cancer of the breast sooner or later reacted with anxiety over possible death. This is a normal reaction. Some of them were able to verbalize it, some repressed it completely, and some carried it unspoken, allowing themselves to be paralyzed with the growing and never quiet fear. The development of anxiety in the patient with breast cancer is a normal concomitant of the disease. It should be anticipated, looked for, and utilized therapeutically. Failure to express anxiety should be viewed with alert suspicion. Everyone involved in a situation with a threat to life reacts with anxiety. This is the mind's way of alerting the self to danger. It is a signal that warns one to prepare for an emergency. The woman with the integrated ego appraises the situation objectively, considers all the facts at hand—involving past performance, degree of immediate danger, and alternative plans for meeting the threat—and then selects a plan that is the most realistic and provides the best chance for survival. This process requires a degree of anxiety that serves as a stimulant for preparation. Too much anxiety will paralyze planning and result in uncoordinated, unrealistic behavior. It should be the goal of every surgeon to keep this anxiety within optimal limits. He partially achieves this by helping the patient

2. Kelly, W. D., and Friesen, S. R.: Do Cancer Patients Want to be Told? Surgery 27:822-826 (June) 1950.

with the process of planning. This involves acquainting the patient with the realistic facts concerning cancer in general, her cancer, biopsy, convalescence, postoperative treatment, and prognosis. She is much better equipped to handle calmly delivered clinical data than the conglomeration of old wives' tales, misinformation, and distorted fantasies about cancer which immediately crowd forth into her mind at the discovery of the lump.

UTILIZATION OF ENERGY TO COMBAT DISEASE

Why is it important to prevent the occurrence of excessive emotional conflicts over cancer of the breast and subsequent mastectomy? In order to answer this we must say a little about the nature of human energy. Every person according to his or her individual constitution has a limited amount of energy available for the work of the body and the mind. Under conditions of physical health, a certain basic amount is utilized in the work of anabolism and catabolism. Above this is the quantity devoted to the problems of successful adaptation to the external environment. This involves the effort expended in socioeconomic endeavors and interpersonal relationships. The neurotic suffers through binding of varying amounts of energy that would otherwise be available to those two essential tasks, i. e., physiological and psychological functioning. The energy is bound by the constant necessity to control strong antisocial impulses or to struggle with unresolved neurotic conflicts. The resolution of an emotional symptom in psychoanalysis results in fresh bursts of enthusiasm or productivity on the part of the patient. This is an expression of energy freed from its static work of struggling with the previously existing neurotic conflict. In unusual physiological or psychological states, i. e., organic disease or an acute problem of environmental adjustment, the balance of available energy shifts to the area which requires it most. A diseased person naturally cuts down on his external activities and concentrates attention and the freed energy on the work of combating the disease process. It is only as he is on the road to recovery that interest shifts from the body back to the world outside.

We know that the body has resources for combating attack by disease. The problem is to make ideal conditions available to the body in its work of defense and recuperation. Little is known about the defensive resources of the body against cancer, but, according to its reaction to other disease processes, it appears that the same reaction must occur in the cancer patient. Perhaps it is on this basis that we eventually will explain occasional "miraculous cures," or how patients live far beyond the predicted life span. True, the resistance against cancer usually is not enough by itself, but aided by surgical and radiological methods it becomes a more potent force and one to be encouraged. The cancer patient should be acquainted with this idea, so that she is given a feeling that there is something within her that, aided by the surgeon, can fight the cancer. This gives a sense of active participation and removes the uncomfortable feeling that she is defenseless against the cancerous invader. Her total available energy should be mobilized for dedication to this task. It would be unfortunate were she to maintain the previously outlined ostrich-like effort to deny cancer. Here she would be squandering valuable energy in her superficial and fatiguing work of concealment and acting, in addition, to the energy expended in her anxiety about inevitable death. We believe that part of the weight loss in cancer is often related to this very concept, i. e., denervating, concealed worry and anxiety over her doomed status.[3]

Energy conservation is an old and simple concept. It has long been applied by physicians through their intuitive efforts to free the suffering person's mind of troubling environmental problems. The way of expressing it has been: "Don't let that bother you. Just concentrate on getting better."

This is the chief underlying rationale of being humanly factual with the patient with cancer of the breast. Acquaint her with the encouraging details of her prognosis and with her role in the total treatment. Explain all the necessary therapeutic steps, such as biopsy, mastectomy, and radiation, and why they are important. Pay attention to the status of her emotional health, do not allow her to build up and retain unnecessary fears and feelings of inevitable death. Explain the need for entering into the next six months prepared for total battle. When the patient fails to mobilize her defenses, as reflected in acute emotional reactions or in putting off treatment hours, bring it to her attention and discuss the reason. Should she fail to respond, do not hesitate to call in a psychiatrist for the job of channeling energy back into the work of disease resistance and medical cooperation.

We do not advocate this approach for cancer in general, only cancer of the breast. Patients with other types of cancer present different reality problems and their anxiety is based on different psychological threats related to the deep emotional meaning of the organ involved.

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3. Rosenbaum, M.: Personal communication to the authors.

Food Refusal in Children.—Any of us can say what the average weight is for a child of a given age and sex, but none of us can say what the normal is, for it is impossible to define the normal. Many parents and doctors are obsessed with weight charts, and think that any departure from the figures given by them means that there is something wrong with the child. A child may be pounds below the average in weight and yet be perfectly normal. . . . Many books give diet sheets for normal children, laying down rigid quantities of foods even for a two-or-three-year old child. Such books inevitably cause trouble, for mothers try to force their children to eat the quantities laid down, and then food is refused. . . . By far the commonest cause of food refusal is food-forcing. Practically every case of poor appetite in children who are free from organic disease is due to this. . . . It would be surprising if nature had failed to equip human beings with an appetite sufficient for their needs, and yet had remembered lambs, calves and other animals, for one does not see animals having to be forced to take their food. . . . The absolute essential in treatment is to stop all forcing. There must be no coaxing, no persuading, no anxious looks at the plate, no bribing, no forcing, no threatening and no punishment. . . . The child is offered the food in a matter of fact take it or leave it manner, and if he takes it no comment is made. There is no need to praise him for it any more than he is praised for playing with his toys. If he refuses it no comment is made.—R. S. Illingworth, M.D., Food Refusal in Children, *Journal of the Royal Institute of Public Health and Hygiene*, December, 1951.

USE OF BISHYDROXYCOUMARIN (DICUMAROL®) IN THE PRESENCE OF IMPAIRED RENAL FUNCTION

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and
Robert R. Henderson, M.D., New York

The concept that impaired renal function is a contraindication to bishydroxycoumarin (dicumarol®) therapy had its origin in early animal experiments. Bollman and Preston [1] produced renal damage in dogs by subcutaneous injection of uranium acetate or by bilateral ligation of the ureters and found a marked sensitivity to bishydroxycoumarin. They noted a similar effect after bilateral nephrectomy. Richards and Steggerda [2] found

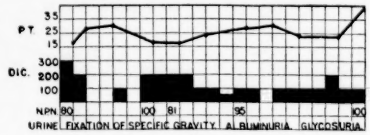

Chart 1 (case 1).—Data on patient with intercapillary glomerulosclerosis in uremia and thromboembolism. In this and the following charts the squares represent time in days. The prothrombin time (P. T.), in seconds and the dosages of bishydroxycoumarin (DIC), in milligrams, as well as the nonprotein nitrogen level, in milligrams per 100 cc., and other renal data are shown.

that bilateral nephrectomy in rats greatly increased the effect of bishydroxycoumarin. An early clinical report by Allen, Barker, and Waugh [3] stated that the effect of bishydroxycoumarin on prothrombin time is excessive in cases of renal insufficiency and advised that the drug be used very cautiously or not at all in these patients. Allen, Barker, and Hines [4] cited cases of two patients treated with this drug, in whom suppression of urine developed owing to the accumulation of crystals of sulfonamide compounds in the renal pelvis. The prothrombin time, which was increased in association with the anuria, returned to normal when urine again was excreted by the kidneys.

Overman and associates [5] were unable to detect bishydroxycoumarin in the urine of dogs after administration of large amounts. This finding, along with their own animal experiments cited above, suggested to Bollman and Preston [1] that the kidney plays an important role

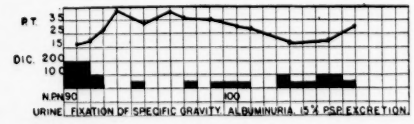

Chart 2 (case 2).—Data on patient with chronic diffuse glomerulonephritis in uremia.

in the destruction of this compound. Weiner and colleagues,[6] in studies on man, found only traces of the drug in the urine after its administration and concluded that it is almost completely metabolized in the body. In a group of patients showing hemorrhagic manifestations of bishydroxycoumarin toxicity, Wright and Prandoni [7] found none with renal dysfunction, although studies were carried out with this in mind. Shapiro and Weiner [8] state that the evidence for considering renal disease a contraindication to bishydroxycoumarin therapy is inconclusive.

In 1949 we were confronted with a patient who had thromboembolic disease and impairment of renal function. Since heparin is excreted by the kidney,[9] and patients with renal disease are sensitive to heparin,[10] we decided to treat this patient with bishydroxycoumarin. It was found that the patient (Case 1) was resistant to the drug, for a high dosage was required to maintain a therapeutic prothrombin time. The drug was subsequently given to eight other patients with impaired renal function, and the findings form the basis of this report.

METHOD

Patients with varying degrees of impairment of renal function were selected for the study. Patients with associated liver disease, gross hematuria, bleeding from the gastrointestinal tract, or

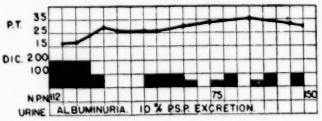

Chart 3 (case 3).—Data on patient with nephrosclerosis in uremia.

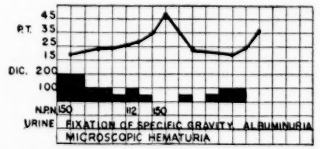

Chart 4 (case 4).—Data on patient with chronic diffuse glomerulonephritis in uremia.

nausea or vomiting caused by uremia were excluded. The Link-Shapiro [11] modification [12] of the Quick method was used in making the prothrombin time determinations, which were done

From the Department of Medicine, New York University College of Medicine, and the Third Medical Division, Bellevue Hospital.

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3. Allen, E. V.; Barker, N. W., and Waugh, J. M.: A Preparation from Spoiled Sweet Clover (3,3'-Methylene-bis-[4-hydroxycoumarin]) Which Prolongs Coagulation and Prothrombin Time of the Blood: A Clinical Study. J. A. M. A. **120**: 1009 (Nov. 28) 1942.

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6. Weiner, M.; Axelrod, J.; Shapiro, S., and Brodie, B. B.: Fate of Dicumarol in Man, Federation Proc. **8**: 345 (March) 1949.

at least three times each week. In some cases, as shown in Charts 2 to 7, the determinations were made more frequently. Bishydroxycoumarin was given orally in doses to reach and maintain prothrombin times ranging from 25 to 50 seconds (30% and 10%), which are considered the optimal levels for therapy of thromboembolic disease.

DATA

The prothrombin times and bishydroxycoumarin (dicumarol®) dosages for the nine patients are summarized in Charts 1 to 9. The clinical diagnoses and pertinent renal data are included. Case 1 was that of a 54-year-old woman. Case 2 was that of a man aged 63. Case 3 was that of a 67-year-old woman. Cases 4 and 5 were those of men, aged 53 and 68. Cases 6, 7, 8, and 9 were those of women, aged 35, 43, 55, and 62, respectively. Only one of the patients (Case 8) was sensitive to the drug. Vitamin K was required to return the prothrombin time to a normal level. This patient was the only one in whom uremia progressed, and a second course of bishydroxycoumarin therapy was reinstituted for comparative study six days before death. At this time, when the nonprotein nitrogen level was 129 mg. per 100 cc., a dose of 600 mg. administered over a three-day period delayed the prothrombin time to 30 seconds; whereas previously, when the nonprotein nitrogen level was 47 mg. per 100 cc., a dose of 550 mg. given over a three-day period produced a prothrombin time

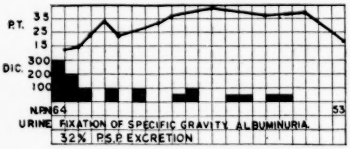

Chart 5 (case 5).—Data on patient with nephrosclerosis in uremia.

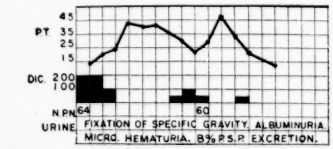

Chart 6 (case 6).—Data on patient with chronic diffuse glomerulonephritis in uremia.

of 57 seconds. It would seem that neither sensitivity nor resistance to the drug are related to the degree of azotemia. The remaining patients (except Case 9) showed varying degrees of uremia, without sensitivity to the drug, and required the usual dosages for maintenance. The patient in Case 9, the only patient without uremia, had marked impairment of renal function, as was evidenced by an inulin clearance of 60 cc. per minute (normal 117 ± 15.6) and an effective renal plasma flow of 218 cc. per minute (normal 594 ± 102.4). This patient was not sensitive to bishydroxycoumarin. Two patients (Cases 4 and 6) showed microscopic hematuria before and during the period of treatment, without any increase in renal bleeding. None of the patients

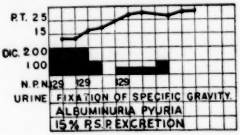

Chart 7 (case 7).—Data on patient with chronic pyelonephritis in uremia.

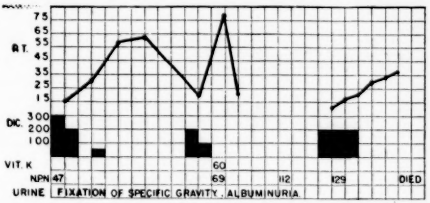

Chart 8 (case 8).—Data on patient with chronic diffuse glomerulonephritis in progressive uremia. Because the patient was sensitive to bishydroxycoumarin, vitamin K (shown in milligrams) was required to return the prothrombin time to a normal level.

had hemorrhagic complications from bishydroxycoumarin therapy. No beneficial or untoward effect on the course of the underlying renal disease was noted during the relatively short period of administration.

COMMENT

The data presented indicate that bishydroxycoumarin therapy may be used safely in patients with chronic renal insufficiency. This observation becomes of practical clinical importance when there is need for anticoagulant therapy in these patients. Since heparin is poorly tolerated by patients with renal disease, bishydroxycoumarin is the drug of choice. The conclusions reached as a result of animal experiments may not be applicable to chronic renal disease in man, since in all these experiments the kidneys were completely functionless. Furthermore, in the experiments of Bollman and Preston [1] uranium may have exerted a toxic effect on the liver [13] as well as on the kidney. The two cases of Allen, Barker, and Hines [4]

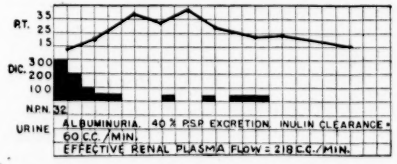

Chart 9 (case 9).—Data on patient with chronic diffuse glomerulonephritis.

were likewise acute cases of complete renal failure, suggesting that the response to bishydroxycoumarin in patients with anuria is different from that in patients with chronic renal insufficiency without anuria. The reason for this difference is not clear.

7. Wright, I., and Prandoni, A.: The Dicoumarin 3,3'-Methylene-bis-(4-hydroxycoumarin): Its Pharmacologic and Therapeutic Action in Man, J. A. M. A. **120**: 1015 (Nov. 28) 1942.

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SUMMARY

Bishydroxycoumarin (dicumarol®) in usual dosage was given to nine patients who had chronic renal disease and impaired renal function, without producing unusual effects on the prothrombin time. Chronic renal insufficiency does not seem to be a contraindication to anticoagulant therapy with bishydroxycoumarin, provided there is no bleeding in the gastrointestinal tract or gross blood in the urine.

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LUMBAR PUNCTURE HEADACHE

Daniel Sciarra, M.D.
and
Sidney Carter, M.D., New York

The occurrence of undesirable reactions following lumbar puncture is not uncommon. The incidence has been variously reported as ranging between 5 and 75%.[1] A prominent feature of the postlumbar puncture reaction, and often its only manifestation, is headache. This symptom usually appears 12 to 24 hours after the puncture, though it may occur in a few hours or may be delayed for several days. Characteristically, the headache is relieved when the patient lies down and becomes accentuated when the patient either sits or stands. In most cases the headache persists for several days, but occasionally it may last for as long as eight weeks.

Various explanations have been given for the appearance of the headache, and various factors have been noted that will modify or prevent it. Some observers have felt that postlumbar puncture headache is psychogenic [2] and that its incidence is greater in persons known to be neurotic.[3] Other investigators, dealing primarily with psychiatric patients, have stated that the incidence of postlumbar puncture headache is not dependent upon the emotional stability of the patient.[1a] The more widely accepted view at present is that the headache is of mechanical origin. Among the mechanical factors that have been considered as contributing to the occurrence of headache are the size of the needle, the position of the patient, and the quantity of fluid removed. It has been known for many years that the size of the needle is a factor in the occurrence of headache; in general, the use of a small-bore needle is attended with a lower incidence of postpuncture headache.[4]

The value of bed rest immediately after the puncture in preventing the occurrence of headache has been investigated by many observers. For the most part they have concluded that the position of the patient after the puncture does not play a significant role in the occurrence of headache.[5] However, in most of these series the patients were kept in bed less than 24 hours. Since the headache can occur up to several days after the puncture, the period of bed rest that has usually been tried does not appear to be adequate.

Not infrequently in clinical practice a small amount of fluid is removed in the hope that this will prevent the appearance of a postlumbar puncture headache. There is some evidence to indicate that the amount of fluid removed has no direct relationship to the occurrence of headache.[7] MacRobert [8] in 1918 first postulated that the probable cause of lumbar puncture headache was the hole in the dura made at the time of puncture. This would help explain why postlumbar puncture headache is worse when the patient is sitting up and disappears when he is lying flat, why the incidence of headache is less when only a small dural opening is made, and why the quantity of fluid removed makes little or no difference in the occurrence of headache. If it is true that the occurrence of headache is dependent upon the hole in the dura and not upon the quantity of fluid removed, it would seem that the incidence of headache should be as great among patients who simply have a dural puncture without removal of fluid as among those who have a puncture with the removal of fluid. We have recently had occasion to do a clinical experiment that has some bearing on this point.

METHOD

Lumbar punctures were performed in a group of patients who were studied on a neurological service. These patients were all ambulatory and had no complaint of headache. In all cases the lumbar puncture was done with the patient in a horizontal position. A no. 18 needle was used in every case. The patients were divided into two groups. In one group (62 cases) a routine lumbar puncture was done with the removal of 10 to 12 cc. of cerebrospinal fluid; in the second group (45 cases) a similar puncture was done, but after the dura was pierced and cerebrospinal fluid had appeared in the needle, the needle was withdrawn. All the patients were allowed up immediately after the puncture and were instructed to follow their usual routine. Since no special instructions were given the patients, the presence of a headache became

From the Department of Neurology, Columbia University, and the Neurological Institute, Presbyterian Hospital.

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3. Adler, H.: Study of Headaches Following Diagnostic Spinal Taps, New York J. Med. **43**: 1328-1330, 1943.

4. Footnote 1a. Dattner, B.: Moderne Therapie der Neurosyphilis: Mit Einschluss der Punktionstechnick und Liquor-Untersuchung, Vienna, Wilhelm Maudrich, 1938.

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8. MacRobert, R. G.: The Cause of Lumbar Puncture Headache, J. A. M. A. **70**: 1350-1353 (May 11) 1918.

apparent in one of two ways. It was either called to the physician's attention or its occurrence was ascertained by a routine check of each patient one week after the puncture.

RESULTS

Lumbar punctures were made in a total of 102 cases. In 45 of the 102 patients a lumbar puncture was performed, but no fluid was removed. In this group, a postlumbar puncture headache developed in 17 patients (38%). In 15 patients the headache developed within the first 24 hours after the puncture, in one it began in 48 hours, and in another in 72 hours. Thus in 88% of those in whom a headache developed, the onset was within the first 24 hours. In the patients in whom headaches developed without removal of fluid, the duration of the headache was variable. In none of the cases did the headache last less than two days, in one case it was present for two days, but in the majority of the cases (94%) it persisted for three to five days.

In 62 of the 102 cases a routine lumbar puncture was done with the removal of 10 to 12 cc. of cerebrospinal fluid. In 29 out of the 62 cases (46%) a postlumbar puncture headache developed. In 26 patients the onset of headache was within the first 24 hours after puncture. In two patients the headache appeared 48 hours after the spinal tap, and in only one patient was its appearance delayed for 72 hours. Therefore, in 90% of those with headache, the headache appeared within the first 24 hours. In this group the duration of the headache was carefully tabulated in only 16 cases. The headache in these cases lasted from one to four days. Only one patient had a headache that lasted for one day, while in the rest of the cases (94%) the headache persisted for two to four days.

COMMENT

These observations indicate that the removal of cerebrospinal fluid does not play a significant part in the production of postlumbar puncture headache. Cook [7] compared the incidence of postlumbar puncture headache in groups of patients from whom he removed varying amounts of fluid. Essentially he concluded that the amount of fluid removed had no influence on the occurrence of headache. It could therefore be postulated that one of the primary mechanisms in the production of postlumbar puncture headache is the leakage of cerebrospinal fluid through the hole in the dura made by the lumbar puncture needle. This theory was initially advanced by MacRobert [8] and amply supported by many other investigators. Fluid has been seen to leak from a persisting hole in the dura both at laminectomy [9] and at autopsy.[10]

Indirect evidence in support of the leakage theory has been supplied by numerous observers,[11] who have noted a marked drop in cerebrospinal fluid pressure at the time of a second lumbar puncture. This drop tends to occur within the first 24 hours and tends to be commoner in the patients in whom postlumbar puncture headache develops.[12]

If the presence of a hole in the dura is a factor in the production of postlumbar puncture headache, then the size of the hole may also influence the occurrence of headache. There is a great deal of evidence to indicate that this is true. Many investigators have observed that with the use of a small-bore needle the incidence of postlumbar puncture headache is markedly reduced.[13]

SUMMARY AND CONCLUSIONS

Lumbar punctures were done in 102 patients. In the 62 patients from whom cerebrospinal fluid was removed the incidence of postlumbar puncture headache was 46%. The majority of these headaches came on within 24 hours after the lumbar puncture and lasted 2 to 4 days. In the 45 patients in whom the dura was pierced but from whom no fluid was removed, the incidence of postlumbar puncture headache was comparable (38%). In this group the headache also came on within the first 24 hours and lasted 2 to 5 days.

It is concluded that the amount of cerebrospinal fluid removed at the time of puncture up to 12 cc. has no effect on the frequency of occurrence of postlumbar puncture headache. This may have immediate clinical applications. The physician who does a lumbar puncture may often be faced by at least two problems. One is the obtaining of sufficient fluid on which to do necessary studies and the other is the avoidance of postlumbar puncture headache. Since 10 to 12 cc. of cerebrospinal fluid is usually sufficient for routine studies and since the removal of lesser amounts does not decrease the incidence of headache, it is suggested that at least 10 cc. be removed routinely.

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9. Mixter, W. J., in discussion on Fremont-Smith, F.; Merritt, H., and Lennox, W. G.: Relationship Between Water Balance, Spinal Fluid Pressure and Epileptic Convulsions, Arch. Neurol. & Psychiat. **28**: 959 (Oct.) 1932.

10. (*a*) Nelson, M. O.: Postpuncture Headaches: Clinical and Experimental Study of Cause and Prevention, Arch. Dermat. & Syph. **21**: 615-627 (April) 1930. (*b*) Merritt, H. H., and Fremont-Smith, F.: Cerebrospinal Fluid, Philadelphia, W. B. Saunders Company, 1938.

11. (*a*) Footnote 10a. (*b*) Marshall, J.: Lumbar-Puncture Headache, J. Neurol., Neurosurg. & Psychiat. **13**: 71-74, 1950. (*c*) Pickering, G. W.: Lumbar Puncture Headache, Brain **71**: 274-280, 1948. (*d*) Alpers, B. J.: Lumbar Puncture Headache, Arch. Neurol. & Psychiat. **14**: 806-812 (Dec.) 1925. (*e*) Jacobæus, H. C., and Frumerie, K.: About Leakage of Spinal Fluid After Lumbar Puncture and Its Treatment, Acta med. scandinav. **58**: 102-108, 1923. (*f*) Gardner, W. J.: Mechanism of Postpuncture Headache, Cleveland Clin. Quart. **10**: 85-87, 1943.

12. Footnote 11b, d, and f.

13. Footnotes 1a, 4, 5, 11d, and 11f.

Transmission of Poliomyelitis.—Available knowledge justifies the conclusion that human feces derived from patients and healthy carriers is the most significant source of virus in nature. Available evidence indicates that the virus which is occasionally present in the throat of patients and healthy carriers does not ordinarily reach the outer environment in significant amounts by droplets from the mouth or nose. . . . The period of communicability cannot at present be said to be limited to a few days before and a few days after onset of illness, but should rather be regarded as potential during the period that virus is generally eliminated in the feces. . . . One may use as a guide the fact that approximately 50% of patients still have demonstrable virus in their stools three to four weeks after onset. . . . Excepting artificial conditions, entry of poliomyelitis virus by way of the mouth can be justifiably regarded as the usual mode of infection. Accordingly, it follows that contaminated food and drink are as important as contaminated fingers in introducing the virus into the body. . . . Under certain conditions, in urban as well as rural communities, filth flies as well as human beings can be carriers of poliomyelitis virus, and should be regarded in the same light.—Albert B. Sabin, M.D., Transmission of Poliomyelitis Virus, *The Journal of Pediatrics*, November, 1951.

CLINICAL NOTES

PRIMARY TREATMENT OF CERVICAL CARCINOMA WITH "KREBIOZEN"

Herbert E. Schmitz, M.D.
and
Charles J. Smith, M.D., Chicago

The following case report constitutes one of a series in which varied malignant growths were treated with "krebiozen" to evaluate the effect of the drug. Since the drug allegedly had been standardized in vivo on the basis of beneficial influence on an untreated mammary carcinoma, it was felt that an untreated, relatively early, cervical malignant growth would offer a unique opportunity to observe any regression produced by the medicament alone.

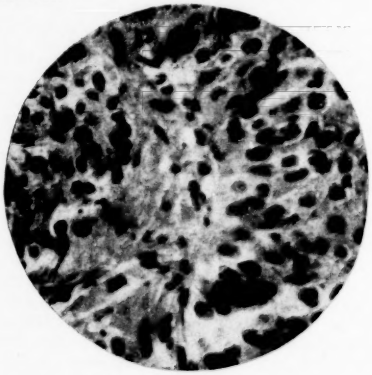

Fig. 1.—Transitional cell carcinoma.

REPORT OF A CASE

Mrs. A. J., a white woman, 56, was admitted to Mercy Hospital Institute of Radiation Therapy on June 5, 1951, complaining of vaginal discharge and bleeding since October, 1950. She had had an uneventful menopause in 1947 and had been in good health until the onset of her present symptoms. Her previous medical and surgical history was noncontributory. She had been delivered uneventfully of her only pregnancy 35 years previously.

Her initial physical examination findings were not remarkable except for a blood pressure of 142/90 and the following pelvic findings: a second degree cystorectocele and a uterus in first degree retroflexion, smooth, movable, and with minimal enlargement. The adnexa were essentially normal. The cervix revealed a proliferating lesion at 5 o'clock, which bled readily on contact; the growth extended partially around the cervical os on the left with beginning extension into the left paracervical areas. The clinical impression was carcinoma of the cervix uteri, Group 3. Microscopic diagnosis of the biopsy specimen taken that day was reported as transitional cell carcinoma (Fig. 1).

Clinical Course.—On June 11, 1951, the patient was admitted to the hospital for laboratory evaluation of renal function. The pertinent findings were: a red blood cell count of 4,300,000, a hemoglobin of 87.7%, a nonprotein nitrogen of 35 mg. per 100 cc., a urea nitrogen of 9 mg. per 100 cc., and a urea clearance of 42.7%.

On June 12, 1951, the first dose (1 cc. [0.01 mg.]) of "krebiozen" (batch number S3 A7 T4) was given. On June 15, 1951, the second dose (1 cc. [0.01 mg.]) of "krebiozen" was given. On July 9, 1951, examination revealed no change in the appearance or extent of the lesion. On July 10, 1951, and July 13, 1951, the third and fourth doses of "krebiozen" were administered. Examinations on July 20, August 3, August 10, September 1, and September 15 revealed no regression of growth. A photomicrograph (Fig. 2) showed no intrinsic cellular change.

Fig. 2.—Photomicrograph showing no intrinsic cellular change after course of "krebiozen"

On Sept. 24, 1951, a total abdominal hysterectomy, bilateral salpingo-oophorectomy and pelvic lymphadenectomy were done. At the time of operation the upper part of the abdomen was examined, and the liver was found to be smooth; the gallbladder, stomach, and kidneys were normal. The uterus was small, freely movable, and in an anterior position. Both tubes and ovaries appeared normal. On opening the leaves of the broad ligament, on the left side, the iliac vessels were found to be covered by a large amount of fatty tissue. At the junction of the left internal and external iliacs with the common iliac, several lymph nodes were found that were hard and seemed to be infiltrated with carcinoma. This was the only area found during the entire operation that seemed to be invaded with carcinoma.

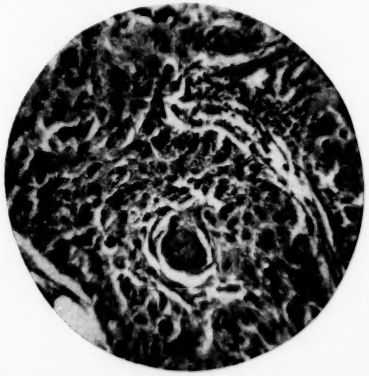

Fig. 3.—Photomicrograph showing infiltrating carcinoma with pearl formation.

Pathological study of the tissues removed revealed that the cervix was infiltrated by a soft pinkish-gray tumor, which involved both cervical lips and a large portion of the cervical canal. The entire growth measured about 2 by 3 cm. The peritoneal surface of the uterus showed no significant changes. The uterine cavity was normal in size and lined with an atrophic endometrium. The fallopian tubes showed no significant changes. The ovaries were normal in size, olive shaped, and each measured about 35 × 25 × 15 mm. The tissues removed from the left iliac area consisted of indurated fat and two whitish-gray, rather firm masses, the largest of which was about 2 cm. long. Both appeared to be lymph nodes. The specimen removed from the right iliac area consisted of dark-brown soft tissue mixed with a large amount of fat. The tissues removed from the obturator area consisted of soft lobulated fat containing whitish-gray granular well-formed nodes, the largest one being 10 mm. in diameter. Microscopic examination of the cervix revealed an infiltrating carcinoma with areas of necrosis and hemorrhage. There were occasional pearl formations and numerous mitotic figures. Sections from the uterus showed atrophic changes of the endometrium. The myometrium showed areas of beginning fibrosis and was infiltrated with thickened blood vessels. Sections from the ovaries revealed atrophic changes. Microscopic examination of all lymph nodes removed revealed proliferation of the reticuloendothelium and occasional areas of hemorrhage, but no tumor cells were found.

Microscopic diagnosis was reported as follows: infiltrating carcinoma of the cervix, atrophic changes of the endometrium and ovaries, and reticuloendothelial proliferation of lymph nodes (Fig. 3).

Two follow-up examinations have revealed the pelvis to be free of recurrence to date.

CONCLUSION

There was no evidence that "krebiozen" had any curative or destructive effect on the lesion in this case.

55 E. Washington St. (Dr. Schmitz).

ENHANCED CLINICAL EFFECTIVENESS OF PURIFIED CORTICOTROPIN

M. S. Raben, M.D.
I. N. Rosenberg, M.D.
V. W. Westermeyer, M.D.
and
E. B. Astwood, M.D., Boston

Earlier clinical experience with partially purified corticotropin indicated that the purified preparation was somewhat more effective therapeutically than a standard preparation in equivalent amounts.[1] The material, which had been purified using cellulose;[2] assayed 20 U. S. P. units per milligram by the Sayers rat test [3] but was judged to have a clinical potency of 30 units per milligram. Subsequent improvement in the method used in this laboratory for purification of corticotropin [4] has permitted clinical use of a considerably more potent preparation. The purified corticotropin that was obtained in good yield using oxycellulose contained 80 units per milligram by bioassay. The clinical effectiveness of an aqueous solution, as judged from the dose requirements in 18 patients (table 1), suggested the therapeutic potency was about 150 units per milligram. The average daily dose was 0.6 mg. (48 units).

TABLE 1.—*Dose Requirement of Aqueous Purified Corticotropin Administered Every Eight Hours*

Disease	No. Patients	Dose Controlling Disease: U. S. P. Units/Day	Dose Controlling Disease: Mg./Day
Rheumatoid arthritis	2	15	0.19
	3	30	0.375
	2	48	0.6
	4	60	0.75
	1	120	1.5
Ulcerative colitis	1	60	0.75
Asthma	2	40	0.5
	1	60	0.75
Acquired hemolytic anemia	1	60	0.75
Boeck's sarcoid	1	60	0.75

Purified corticotropin was administered by subcutaneous injection and was given every 8 hours in aqueous solution, or every 24 or 48 hours in a gelatin solution, or as a suspension in sesame oil. The relative effectiveness of the preparations often was compared in the same patients. Both gelatin and oil prolonged the action of corticotropin, but gelatin was more efficient and reduced the daily dose below that required with injections of the aqueous solution at eight hour intervals (tables 1 and 2). Evidence of excessive dosage was common in this series of patients, particularly before the augmented clinical potency was appreciated. Hirsutism, rounding of the face, and marked water retention have, however, occurred even with the lowest doses employed (0.19 to 0.3 mg. per day). No qualitative differences were noted with the purer preparation in the therapeutic response or in the overdosage effects. The fall of the erythrocyte sedimentation rate and the rise in 17-ketosteroid excretion

TABLE 2.—*Dose Requirement of Long-Acting Preparations of Purified Corticotropin Administered Every Twenty-Four to Forty-Eight Hours*

Disease	No. Patients	Vehicle	Dose Controlling Disease, U. S. P. Units/Day
Rheumatoid arthritis	2	Gelatin	15
	7	.....	30
	2	.....	45
	1	.....	60
	1	Oil	48
	2	.....	80
Ankylosing spondylitis	1	Gelatin	30
	1	.....	60
Acute scleroderma	1	Gelatin	30
Lupus erythematosus	1	Gelatin	15
	1	.....	30
	1	Oil	80
Chronic dermatitis	1	Gelatin	45
	1	Oil	80

From the Ziskind Research Laboratories, New England Center Hospital, and the Department of Medicine, Tufts College Medical School.

Dr. David Klein of the Wilson Laboratories supplied the gelatin preparation of purified corticotropin in the form of corticotropin (Wilson) gel.

This investigation was supported, in part, by research grants from the National Institutes of Health, United States Public Health Service, and from the American Cyanamid Company. Dr. V. W. Westermeyer is a Fellow of the New England Chapter, Arthritis and Rheumatism Foundation.

1. Rosenberg, I. N., and others: Clinical Evaluation of Corticotropin Therapy, A. M. A. Arch. Int. Med. **88**: 211-234 (Aug.) 1951.

2. Payne, R. W.; Raben, M. S., and Astwood, E. B.: Extraction and Purification of Corticotropin, J. Biol. Chem. **187**: 719-731 (Dec.) 1950.

3. Sayers, M. A.; Sayers, G., and Woodbury, L. A.: Assay of Adrenocorticotrophic Hormone by Adrenal Ascorbic Acid-Depletion Method, Endocrinology **42**: 379-393 (May) 1948.

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were consistent with the therapeutic efficacy of the doses used. The daily urinary 17-ketosteroid excretion of a patient receiving 0.3 mg. per day (24 units) was 47 mg., while another patient excreted 39 mg. while receiving 0.375 mg. per day of corticotropin, and 72 mg. with 0.75 mg. per day. Two patients who had received corticotropin continuously for more than one and one-half years were among the most sensitive to the therapeutic and overdosage effects of the purified preparation. A patient who offered a particularly favorable opportunity for a comparison of the potency of different preparations had been treated for rheumatoid arthritis for six months with 100 mg. per day of cortisone, with fair control of symptoms. When the treatment was changed to aqueous purified corticotropin, the same degree of control was obtained with 0.3 mg. per day (24 units). When, after seven weeks of this treatment, a standard preparation of corticotropin was used for three weeks, only minimal therapeutic effects were obtained with 60 units per day. At this point, 30 units per day (0.375 mg.) of aqueous purified corticotropin produced prompt and complete improvement.

By comparison with less potent preparations, purified corticotropin appeared to be about twice as effective clinically as would be expected from the unit potency determined by animal assay. Similar clinical responses were obtained with daily doses of 90 units of a glacial acetic acid extract of pig pituitary powder (2 units per milligram), 60 units of a cellulose-purified preparation (20 units per milligram), and 45 units of the oxycellulose-purified material (80 units per milligram) employed in this study. This difference is not attributable to an error in the bioassay, for the purified material was also twice as active as the equivalent amount of the cruder product from which it was derived.[5]

The reason for the increased efficiency has not been established, but it may be related to increased stability of purified corticotropin in body fluids. It has been observed that, while certain other preparations deteriorate at neutral pH,[6] and lose corticotropic activity rapidly upon admixture with blood in vitro, the oxycellulose-purified material is stable under these conditions.[7] It is of interest that a satisfactory response has been obtained with purified corticotropin prepared from pig pituitaries in patients who had become unresponsive to standard preparations derived from the same species.[8] The possibility that cruder preparations may contain destructive contaminants is suggested by the recent demonstration of two proteolytic enzymes in an extract of standard potency.[9] However, the increased efficiency of purified corticotropin could also conceivably result from the removal, during purification, of physiologically antagonistic substances.

It is of interest that corticotropin, at this stage of purity, is 150 times as effective clinically as the standard corticotropin and at least 250 times as effective on a weight basis as cortisone. In the purification of corticotropin by the oxycellulose method, 90% of the hormone in a glacial acetic extract is recovered in the purified fraction. The increased therapeutic efficiency achieved by purification reduces the dosage requirement and thus in effect makes available an increased amount of corticotropin for clinical use. These findings indicate that newer concentrates of corticotropin differing in purity or in method of preparation will require clinical evaluation to determine dosage and frequency of administration.

Harrison Ave. and Bennet St. (Dr. Astwood).

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9. Adams, E., and Smith, E. L.: Proteolytic Activity of Pituitary Extracts, J. Biol. Chem. **191**: 651-664 (Aug.) 1951.

STERILE LANCETS FOR BLOOD SAMPLING

Carl W. Walter, M.D.
William P. Murphy Jr., M.D., Boston
and
Frank C. Comploier, B.S., Washington, D. C.

Among the epidemiological factors in the transmission of homologous serum jaundice, the spread via cannulated needles used for obtaining blood samples and tattooing needles has been substantiated.[1] The possibility of needle transmission of poliomyelitis has been empha-

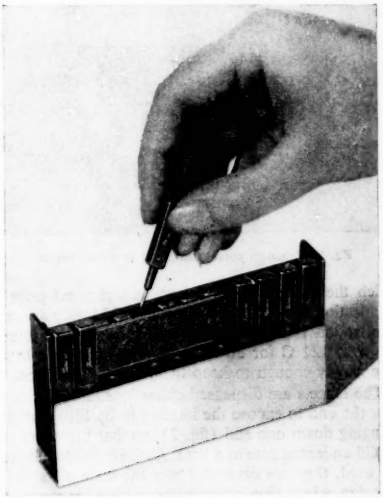


Fig. 1.—Case of stainless steel lancets for safe acupuncture.

sized.[2] Sterilization in saturated steam at 121 C or dry heat at 160 C is essential, because chemical disinfection is inadequate against the virus concerned.

Surgeon, Peter Bent Brigham Hospital, and Assistant Clinical Professor of Surgery, Harvard Medical School (Dr. Walter); Research Fellow in Medicine, Peter Bent Brigham Hospital (Dr. Murphy); and Technical Assistant to the Medical Director, National Blood Program, American Red Cross (Mr. Comploier).

1. Syringe-Transmitted Hepatitis: editorial, New England J. Med. **239**:70 (July 8) 1948. Smith, B. F: Occurrence of Hepatitis in Recently Tattooed Service Personnel, J. A. M. A. **144**:1074 (Nov. 25) 1950.

2. Lenard, A.: Poliomyelitis: The Possibility of Syringe Transmission, M. Times **79**:395 (July) 1951.

Safe acupuncture of the individual patient presents problems in packaging, sterilizing, and dispensing lancets. Accidental pricking of the fingers of technicians and supply room workers must be guarded against. In hospital and clinic practice and blood donor evaluation, so many lancets are used that maintenance of sharpness, the provision for automatic cleaning, and prevention of loss are major considerations. A technique is presented that accomplishes these ends.

The lancets (fig. 1) are made of a piece of cutlery stainless steel embedded in a waterproof nylon handle. The piercing tip is ground in the shape of apposed hyperbolic sections as in the conventional harness maker's awl. The sharp hyperbolic edge cuts skin cleanly without tearing or stretching. The incision is not painful and bleeds freely. The handle has a conical section at the blade end, which serves as a plug to hold the instrument in the case.

The lancet case is designed to provide for cleaning, sterilization, storage, dispensing, and discard of the lancets. It is molded of heat-resistant plastic. The front step of the case has a series of tapered pockets, into

Fig. 2.—Removing cover from lancet to expose lancets.

which the freshly rinsed lancets are plugged prior to sterilization. The aluminum cover is slid into place, and sterilization is accomplished by exposure to saturated steam at 121 C for 30 minutes. The lancets fit in the case snugly enough to keep them sterile until used.

The lancets are dispensed either by sliding the cover over the end to expose the handles or by lifting up and swinging down one end (fig. 2), so that the cover can be slid under the case as a base. As the individual lancets are used, they are discarded into the open slots in the rear step, where they become inaccessible for reuse (fig. 1) and where the protected points are exposed for inspection and cleaning.

When all the lancets are in the discard slots, they are cleaned by standing the case in 2 cm. of detergent for 10 minutes. The case is then held bottom side up under running tap water to rinse off the detergent. The cover is removed, and the lancets are spilled onto a paper towel. The lancets are plugged into the wet tapered holes, and the cover is replaced prior to sterilization.

SUMMARY

Equipment and technique are described for the accomplishment of safe acupuncture.

COUNCIL ON PHARMACY AND CHEMISTRY

NEW AND NONOFFICIAL REMEDIES

The following additional articles have been accepted as conforming to the rules of the Council on Pharmacy and Chemistry of the American Medical Association for admission to New and Nonofficial Remedies. A copy of the rules on which the Council bases its action will be sent on application.

R. T. STORMONT, M.D., *Secretary.*

Meth-Dia-Mer-Sulfonamides (See New and Nonofficial Remedies 1951, page 103).

Suspension Meth-Dia-Mer-Sulfonamides: 473 cc. bottles. A suspension containing 29 mg. each of sulfadiazine, sulfamerazine, and sulfamethazine in each cubic centimeter. Premo Pharmaceutical Laboratories, Inc., South Hackensack, N. J.

Tablets Multazine: 0.5 gm. Each tablet contains 0.167 gm. each of sulfadiazine, sulfamerazine and sulfamethazine. Kremers-Urban Company, Milwaukee, Wis.

Tablets Meth-Dia-Mer-Sulfonamides: 0.5 gm. Each tablet contains 0.167 gm. each of sulfadiazine, sulfamerazine and sulfamethazine. Premo Pharmaceutical Laboratories, Inc., South Hackensack, N. J.

Protein Hydrolysates (See New and Nonofficial Remedies 1951, page 400).

Solution Hyprotigen 6%: 500 cc. and 1,000 cc. bottles. An enzymatic hydrolysate of casein containing amino acids and polypeptides. It contains approximately 55% of its total nitrogen as alpha amino nitrogen. U. S. Trademark 434,994. Don Baxter, Inc., Glendale, Calif.

Solution Hyprotigen 6% with Dextrose 5%: 500 cc. and 1,000 cc. bottles. An enzymatic hydrolysate of casein containing amino acids and polypeptides. It contains approximately 55% of its total nitrogen as alpha amino nitrogen. U. S. Trademark 434,994. Don Baxter, Inc., Glendale, Calif.

p-**Aminosalicylic Acid** (See New and Nonofficial Remedies 1951, page 89).

Powder Parasal: 113.4 gm., 226.8 gm., and 453.6 gm. bottles. Bulk: 11.34 kg. and 22.68 kg. drums for compounding use. U. S. Trademark 585,718. The Panray Corporation, New York.

Tablets Parasal: 0.5 gm. U. S. Trademark 585,718. The Panray Corporation, New York.

Mannitol Hexanitrate (See New and Nonofficial Remedies 1951, page 232).

Tablets Mannitol Hexanitrate: 16 mg. and 32 mg. Direct Laboratories, Inc., Buffalo, N. Y.

Tablets Mannitol Hexanitrate: 32 mg. Raymer Pharmacal Company, Philadelphia.

Progesterone-U.S.P. (See New and Nonofficial Remedies 1951, page 361).

Solution Progesterone in Oil: 10 cc. vials. A solution in sesame oil containing 10 mg. of progesterone in each cubic centimeter. Preserved with 0.5% chlorobutanol. Kremers-Urban Company, Milwaukee, Wis.

Aminophylline-U.S.P. (See New and Nonofficial Remedies 1951, page 299).

Solution Aminophylline: 10 cc. ampuls. A solution containing 25 mg. of aminophylline in each cubic centimeter. The Blue Line Chemical Company, St. Louis.

Methimazole (See THE JOURNAL, Dec. 22, 1951, page 1668).

Tablets Tapazole: 10 mg. Eli Lilly & Company, Indianapolis, Ind.

COUNCIL ON PHYSICAL MEDICINE AND REHABILITATION

The Council on Physical Medicine and Rehabilitation has authorized publication of the following reports.

RALPH E. DE FOREST, M.D., *Secretary.*

MAICO AUDIOMETER, MODEL E-2, ACCEPTED

Manufacturer: The Maico Company, Inc., 21 N. Third St., Minneapolis 1.

The Maico Audiometer, Model E-2, is designed as a two-channel, pure tone instrument for research purposes. The apparatus includes a pair of matched air receivers (one for each channel) and a calibrated bone conduction unit.

The instrument operates on alternating current of 25 or 60 cycles at 110-120 volts or 220-240 volts. It draws 0.5 ampere at 115 volts and 0.25 ampere at 230 volts; so that the wattage is 60. It measures 35 (height) by 57 by 32 cm. (13⅜ by 22½ by 12¼ in.) and weighs 19.5 kg. (43.5 lb.).

Maico Audiometer, Model E-2

The instrument consists of one main oscillator providing the standard audiometer test tones, one auxiliary oscillator providing a 1,000-cycle reference tone, and a masking oscillator. There are two output channels with separately controlled attenuators. The output from Channel 1 may be either the standard test tones for air or bone conduction, or microphone speech for air or bone conduction. The output from Channel 2 may be the standard test tones, the 1,000-cycle reference tone, the masking tone, or the microphone for air conduction only. The frequencies supplied from both channels are 125, 250, 500, 1,000, 2,000, 3,000, 4,000, 6,000, 8,000, and 10,000 cps.

Evidence from a laboratory acceptable to the Council indicated that this instrument satisfied the minimum requirements of the Council for pure tone audiometers. The Council on Physical Medicine and Rehabilitation voted to include the Maico Audiometer, Model E-2, in its list of accepted devices.

OFFNER ELECTROENCEPHALOGRAPH, TYPE D, ACCEPTED

Manufacturer: Offner Electronics Inc., 5320 N. Kedzie Ave., Chicago 25.

The Offner Electroencephalograph, Type D, is a six or eight channel ink-writing instrument. In general appearance it resembles a writing desk which can be moved about on casters. It measures approximately 100 (height) by 180 by 90 cm. (3½ by 6 by 3 ft.) and weighs 272 kg. (600 lb.). Crated for shipment it measures 118 by 202 by 100 cm. (46½ by 79½ by 39½ in.) and weighs 364 kg. (801 lb.). It operates entirely from 50 or 60 cycle alternating current power lines, at 105 to 125 volts, and draws 500 watts. No batteries are used.

Offner Electroencephalograph, Type D

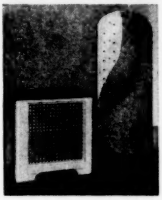
Clinical and electrophysical observations in laboratories acceptable to the Council gave evidence that the instrument was soundly constructed and performed as represented by the manufacturer.

The Council on Physical Medicine and Rehabilitation voted to include the Offner Electroencephalograph, Type D, in its list of accepted devices.

HYDRO-PNEUMATIC BATH ACCEPTED

Manufacturer: Jay H. Meseroll, 130 S. 19th St., Philadelphia 3.

The Hydro-Pneumatic Bath, formerly named the Massage Master Bath, Model M, is a device designed for use in connection with a bath tub in such a way as to agitate and aerate the water. It consists of two principal parts: (1) a perforated plate of stainless steel which lies on the bottom of the tub and bears the weight of the patient and (2) a control unit consisting of an electrically driven air pump housed in a cabinet. The steel plate or bath unit measures 117 by 44 cm. (46 by 17½ in.) and weighs 16 kg. (35 lb.). The control unit measures 62 (height) by 61 by 41 cm. (24½ by 24 by 16 in.) and weighs 63 kg. (140 lb.). The combined shipping weight of the two units when packed is 113 kg. (250 lb.).



Hydro-Pneumatic Bath

The motor in the control unit requires a 60 cycle alternating current at 115 volts and draws 500 watts of power.

Evidence of sound construction and satisfactory performance was obtained from a source acceptable to the Council. The occasional addition of hot water while the bath is in use may be necessary in order to keep the temperature reasonably constant. Therapeutic benefits to be anticipated are those recognized for agitated warm baths in general. The Council on Physical Medicine and Rehabilitation voted to include the Hydro-Pneumatic Bath in its list of accepted devices.

RESTORATOR ACCEPTED

Manufacturer: Rudolph J. Boyko, 640 Madison Ave., New York 22.

The Restorator is a device for administering active exercise in the form of a circular alternating movement like that made in pedaling a bicycle. The exercise can be carried out by either hands or feet. The distinctive feature of this device is the absence of a seat. The patient remains in bed or on whatever chair he is occupying. The apparatus is light, portable, and versatile. The pedal arms can be provided with extensions long enough to make a sort of shoulder wheel.

Restorator

The over-all measurements of the apparatus when unpacked are 23 (height) by 79 by 41 cm. (9 by 31 by 16 in.), and it weighs 7.7 kg. (17 lb.). The shipping weight is 9 kg. (20 lb.); the package measures 28 by 84 by 46 cm. (11 by 33 by 18 in.). Evidence from sources acceptable to the Council indicated that this device is useful in exercises for the foot, ankle, leg, hip, wrist, arm, and shoulder provided patients are carefully instructed in its use. The Council on Physical Medicine and Rehabilitation voted to include the Restorator in its list of accepted devices.

HEALTH RESORT FACILITIES OF THE LEO N. LEVI MEMORIAL HEALTH RESORT ACCEPTED

Operating Agency: Leo N. Levi Memorial Hospital, Prospect Ave., Hot Springs, Ark.

The Leo N. Levi Memorial Hospital was established in 1914 and has 116 beds. The hospital is approved by the Council on Medical Education and Hospitals for the training of resident physicians and also by the American College of Surgeons. The mineral water, the same as that supplied to all of the health resorts at Hot Springs, is available both for drinking and for bathing, and no special therapeutic claims are made for it. Evidence from sources acceptable to the Council showed that the resort was well managed, had good medical supervision, and satisfied requirements of the Advisory Committee on American Health Resorts. The Council on Physical Medicine and Rehabilitation voted to include the Health Resort Facilities of the Leo N. Levi Memorial Hospital in its list of accepted health resorts.

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AMERICAN MEDICAL EDUCATION FOUNDATION

The year 1952 will be the greatest in history for voluntary philanthropy and for the American Medical Education Foundation, according to leading speakers at the Feb. 17 meeting of American Medical Education Foundation. Leaders from 40 states met at the Sheraton Hotel, Chicago, to start the 1952 campaign. A minimum of 2 million dollars from the medical profession is the goal in 1952, according to Dr. Elmer L. Henderson, Foundation President and Chairman of the one day workshop. He reported the receipt of 720 individual contributions totaling more than $40,000 in the first six weeks of 1952, which he believes gives promise that the goal can be reached.

Dr. James E. Almond, Chicago, president of the American City Bureau and a pioneer among fund raising counselors, in the principal address commended the medical profession for the start that was made in 1951 toward solving the problems of medical school financing. Dr. Almond stimulated the group by stating that in 1952 there will be the greatest total contribution to voluntary philanthropy in the history of this country and that the volume of dollars will show a steady annual increment for a long time to come. "The penalties of leadership," said Dr. Almond, "cannot compare with its privileges. The men who are taking the initiative in this crusade will have their achievements recognized through the ministry of higher education for generations to come."

The past history and present policies of both the American Medical Education Foundation and the National Fund for Medical Education were presented by Dr. Donald G. Anderson, Secretary-Treasurer of the Foundation. Dr. Anderson also spoke on the campaign plan to be followed in 1952, which places emphasis at the so-called grass roots level. He pointed out that, since each state society is in the best position to judge what kind of a campaign will be most effective among its membership, the decision in this matter is being left to each society. It is hoped, however, that each society will work out a plan for approaching its members individually as well as through mass media. Each state should set its own goal as to the amount it thinks it can raise. The Foundation has set a minimum goal of 2 million dollars for 1952, and hopes to secure contributions from a large number of physicians. If enough physicians contribute, the amount can be obtained from them alone. The individual physician should determine the amount of his own contribution, although it should be clear that token gifts alone will not raise the money that is needed. The 1952 drive calls for an intensive effort during the months of April, May, and June, with the remainder of the year being devoted to completion of local campaigns and to securing special gifts from various sources within the medical profession.

R. F. Staudacher, Executive Secretary of the American Medical Education Foundation, discussed the materials and campaign aids available for use throughout the country. The experiences of several states during the 1951 drive were outlined by Drs. John W. Green, California; Atha Thomas, Colorado; W. G. H. Dobbs, Connecticut; J. W. Denny, Indiana; Newland E. Day, Maryland; Thomas H. Lanman, Massachusetts; J. Stanley Kenney, New York; William J. Orr, New York, and Walter F. Donaldson, Pennsylvania.

It was evident at this meeting that there is sufficient enthusiasm among the leaders in the drive to justify hope for successful completion of the campaign to raise funds for medical education. More help is needed, particularly at the local level, and if physicians are interested in solving their own problems they should volunteer to give money and time. A commendable start has been made, but the impetus for a driving campaign must come from the profession as a whole.

MISINTERPRETATION OF "NEEDS" FOR MEDICAL CARE

Comparisons between the practice of law and the practice of medicine can be helpful or misleading. Studies in recent years of the unmet needs for legal and medical services seem to provide some useful comparisons. The term "unmet needs" for legal and medical services has, however, been used in a fashion that implies unmet desires, whims, or mere wants; moreover, for the purposes of medical economics, the term "unmet needs" as used in these studies is quite awkward, because it does not imply that these "needs" are sufficiently acute to induce the individual to seek medical care. The medical economist would prefer the term "demand," because it implies needs or wants coupled with the ability and willingness to actually seek medical attention. If this particular use of the term "unmet needs" is kept in mind, these recent studies do provide some helpful comparisons between the practice of law and the practice of medicine.

In 1948, the American Bar Association, as a part of its Survey of the Legal Profession, published a study by Koos of family needs for legal services.[1] In 1950 Michigan State College published a study by Hoffer and others of the unmet needs for medical services in certain Michigan communities.[2] Koos concluded that the families covered in his survey failed by varying margins to obtain the quantity and quality of legal services that Koos considered reasonably necessary to meet the family needs for legal services. He also gave considerable attention to the

1. Koos, E. L.: The Family and the Law: Survey of the Legal Profession, Boston, American Bar Association, 1949.
2. Hoffer, C. R., and others: Health Needs and Health Care in Michigan, Special Bulletin 365, East Lansing, Mich., State College Agricultural Experiment Station, Section of Sociology and Anthropology, June, 1950.

reasons for failure of the families to engage the services of lawyers. Hoffer measured the unmet needs for medical services in certain Michigan communities by interviewing persons who described symptoms for which they had neither sought nor received medical attention. Spot checks were made by physicians to determine the reliability of the self-diagnoses as a method of measuring unmet needs. Hoffer, like Koos, was interested in the reasons given during the interview for not seeking and obtaining professional services.

Similar studies of the unmet needs for dental services, for the services of accountants, engineers, and other professional persons are not available, but such studies should make possible similar evaluation of relative unmet needs. Indeed, it would be necessary to have studies of the unmet needs for all important commodities and services before one could appraise the relative standing or rank of unmet needs for any one commodity or service. Until such additional studies are made no frame of reference can be found in which to evaluate the relative importance of unmet needs for medical services. Since persons literally need everything, one cannot say that the unmet needs for a particular service are great, because one does not know "how great is great" until he knows the unmet needs for many important goods and services.

There is widespread failure to realize the necessity for considering unmet needs on a relative rather than an absolute scale. The idea that human wants or needs are expandable without limit, both as to number and variety, is basic in the study of economics. Moreover, there are unmet needs for every good or service that has a price; these are the so-called economic goods and services. The persons who render these services have livings to earn for themselves and their families. Unlike air, these services command a price. If the price were higher, fewer persons would buy the service, and if the price were lower more persons would buy the service. This notion of unmet needs is, therefore, a fundamental characteristic of a system of free enterprise and free prices. There are unmet needs for every service or commodity that is sold, and the bare statement that there are unmet needs for legal and medical services is an "elucidation of the obvious."

A study, however carefully conducted, that limits itself to the unmet needs for one type of service is likely to be misinterpreted. Conclusions can be reached according to the degree of alarm one wishes to create of the frightful conditions traceable to the unmet needs for the one service under consideration. The whole person in his particular economic and social setting must be considered as the unit rather than each individual service or commodity; for example, if it could be shown that the relative degree of attainment of medical services for the people in a particular state was lower than the relative degree of attainment of legal services, dental services, or other services, one could conclude that medicine is lagging, and that the reasons for the lag should be found. But one need not rely solely on the relative position of the unmet needs for medical care; other sources of information are available, for example, mortality and morbidity rates, which reflect to a considerable extent the prevailing level of medical service.

ELECTROENCEPHALOGRAPHY AND HEARING IN YOUNG CHILDREN

A diagnosis of hearing loss in children under 3 years of age is often difficult to establish. Hearing tests that are useful in the case of adults are not applicable to such children, because they cannot reliably make their sound perception known. The background of hearing loss in young children is relatively unexplored, particularly in terms of etiology and central nervous disease.

According to Marcus and his associates,[1] electroencephalography provides a feasible means of measuring hearing acuity in young children at a time when conscious participation is not required. These investigators studied 71 patients in the clinic and by electroencephalograms taken with the patients asleep. It was noted that some children who evinced poor or no speech but good or moderately impaired hearing displayed an unusually high incidence of electroencephalographic evidence of brain damage. Of 53 children with pronounced hearing impairment, 19 had abnormal encephalograms. Electroencephalographic evidence of intracranial disorder was found in 9 of 18 children with slight to moderate hearing impairment, who had delayed, retarded, or unintelligible speech.

On the basis of these studies, the electroencephalograph appears to offer the clinician additional information regarding hearing function when viewed in its context of peripheral end organ, sensory nerve, brain stem, and cerebral ramifications and motor expression. Electroencephalography in sleep gives a qualitative estimate of the presence or absence of an intact end organ and an objective method of determining the presence or absence of brain damage to substantiate the possibility of a central nervous system defect in the hearing-speech-sensory-motor arc. Combining current otological procedures with electroencephalography in carefully selected cases enables clinicians to be more specific in differentiating between cochlear disease and central nervous system dysfunction or aphasia.

SYMPOSIUM ON PULMONARY AND CARDIAC DISEASES

A group of physicians will leave the United States about March 8 to visit Cuba, Panama, Venezuela, and the Dominican Republic, where they will present a symposium on pulmonary and cardiac diseases to the physicians of those countries. The program will consist of lectures, ward rounds, demonstrations, and operative chest surgery. The trip is sponsored by the World Medical Association in order to provide for the exchange of ideas and techniques on an international level. The World Medical Association hopes that funds will become available so that more trips of this kind can be made to other parts of the world and thus further international medical relations. Details concerning this trip will be found on page 850 in this issue of THE JOURNAL.

1. Marcus, R. E.; Gibbs, E. L., and Gibbs, F. A.: Electroencephalography in the Diagnosis of Hearing Loss in the Very Young Child, Dis. Nerv. System **10**: 170 (June) 1949. Marcus, R. E.: Hearing and Speech Problems in Children: Observations and Use of Electroencephalography, A. M. A. Arch. Otolaryng. **53**: 134 (Feb.) 1951.

ORGANIZATION SECTION

WORLD MEDICAL ASSOCIATION SPONSORS TRIP

The World Medical Association is sponsoring a trip to Cuba, the Dominican Republic, Panama, and Venezuela of a group of distinguished American physicians who will present a symposium on pulmonary and cardiac diseases to the physicians of those countries. The plan is one of those envisaged for the exchange of ideas and techniques on an international level and will do much to cement international medical relations.

The group making the trip will be headed by Dr. Edgar Mayer of New York, professor of clinical medicine at New York University Post-Graduate Hospital, Bellevue Medical Center, New York. Accompanying him will be: Dr. J. M. Chamberlain, chest surgeon, Bellevue and Roosevelt Hospitals, New York; Dr. Arthur Cracovaner, attending otolaryngologist at the Lenox Hill and Kingsbridge Veterans hospitals and bronchoscopist, Bellevue Hospital, New York; Dr. DeWitt Daughtry, consultant in thoracic surgery, Veterans Administration Hospital, Coral Gables, Fla., and Jackson Memorial Hospital, Miami, Fla.; Dr. Irving Kane, attending physician in pulmonary disease, Lincoln Hospital, in chest disease, Beth David Hospital, and in diagnostic roentgenology, Montefiore Hospital, New York; Dr. Earl Templeton, director and attending physician, Miami Heart Institute and St. Francis Hospital, Miami, Fla.; and Dr. Robert Wallis, attending physician, Roosevelt Hospital, New York. The majority of these physicians are members of the American College of Chest Physicians.

The program will consist of illustrated lectures, ward rounds, demonstrations, and operative chest surgery. The general topics to be discussed are: Rhinolaryngology in Pulmonary Diseases (Dr. Cracovaner), Diagnosis and Treatment of Pulmonary Diseases (Dr. Mayer), Chest Radiology (Dr. Kane), Pulmonary Surgery (Dr. Chamberlain), Diagnosis and Treatment of Heart Disease (Dr. Templeton), Cardiac Surgery (Dr. Daughtry), and Nutritional Aspects of Chronic Disease (Dr. Wallis).

The local arrangements are being made by the national medical associations of the countries to be visited. The group will leave this country about March 8, 1952, and will be away approximately three weeks. While arrangements have been made by The World Medical Association, which is sponsoring the trip, the expenses are being borne by the persons making the trip. The World Medical Association hopes that funds will become available so that more trips of this kind can be financed to other areas of the world.

FEDERAL MEDICAL LEGISLATION

Royalties for Medical Education

On Feb. 18, Representative Kennedy of Massachusetts introduced H. J. Res. 381. This resolution would provide that royalties received under certain mineral leases governing submerged lands of the Continental Shelf be set aside in the Treasury for use in grants-in-aid in medical education and research in the construction and operation of hospitals and other community health facilities. The resolution proposes that the Secretary of the Interior be authorized to grant mineral (tideland oil) leases covering the submerged lands of the Continental Shelf. Moneys received therefrom would be held in a special account in the Treasury during the present emergency. Congress could authorize the use of these funds only for urgent developments essential to the national security, including the training of physicians, dentists, nurses, medical specialists, and technicians, and the construction of hospitals and community health facilities. After the emergency, a portion of such moneys would be used as determined by Congress as grants-in-aid for (1) medical research and education for the training of the above-mentioned group of medical and allied persons and (2) the construction and operation of hospitals and other community health facilities.

The resolution would create a National Advisory Council on Grants-in-Aid Health and Medical Education to be composed of 12 persons experienced in the fields of medical sciences, education, public health, hospital management, public administration, or related fields. It requires that this council be bipartisan, four members to be appointed by the President of the U. S., four by the President of the Senate, and four by the Speaker of the House. The council would be required to submit to Congress, not later than April 1, 1953, recommendations concerning the amount of money to be required annually for use as grants for medical education, research, construction and operation of hospitals and other community health facilities, with a plan for equitable allocation of funds.

Lincoln Treatment Investigation

Representative Rankin of Mississippi introduced H. R. 6539, which would provide for a study by the Administrator of Veterans' Affairs of the methods and practices employed by Dr. Robert E. Lincoln in the treatment of tuberculosis and cancer. The bill was introduced at the request of the AMVETS. The proposed study would be made under the direction of the Administrator of the Veterans Administration, and a report of the findings would be made to Congress within two years. The controversy over the Lincoln treatment of cancer and tuberculosis first received attention on Capitol Hill when Sen. Charles Tobey made a speech on the Senate floor and introduced several articles in the *Congressional Record*.

STATE MEDICAL LEGISLATION

Colorado

Bill Enacted.—S. 20, was approved February 8, 1952. It amended the **narcotic drug act** by, among other things, providing a person who sells or administers narcotic drugs to persons under the age of 21 years may be imprisoned up to 20 years. Otherwise the maximum imprisonment is 15 years.

Kentucky

Bills Introduced.—H. 279, proposes to repeal and reenact the law relating to the licensing of **chiropodists** and defines chiropody as the diagnosis and the local, medical, mechanical and surgical treatment of ailments of the human foot, and massage in connection therewith, except amputation of the foot or toes, or the use of anesthetics other than local, or the use of drugs or medicines other than local. H. 398, to amend the workmen's compensation act, proposes that whenever an employee is examined or treated for an industrial injury by a doctor or physician, the employer shall cause to be furnished to the employee and to the Board a copy of **the report of the physician** showing the examination or treatment administered. S. 166, relating to city-county boards of health and the administration of hospitals by such boards, provides, among other things, that no person taken to such a hospital for **emergency treatment** shall be denied admission on account of his financial condition nor shall the administration of emergency treatment to such person be delayed on account thereof. S. 184, proposes to direct the legislative research commission to make a thorough and complete investigation, study and survey of existing and required **health facilities and services** provided, or which should be provided, at public expense for the people of the Commonwealth.

Maryland

Bills Introduced.—H. 51, proposes to require the **physical examination of food handlers** at least 30 days prior to employment, showing freedom from any infectious, contagious disease. H. 63, proposes that licensed

The summary of federal legislation was prepared by the Washington Office of the American Medical Association and the summary of state legislation by the Bureau of Legal Medicine and Legislation.

physical therapists shall hold a doctorate degree in physical therapy from an incorporated school, college or university certified by the Maryland State Physical Therapy Society, Incorporated.

Massachusetts

Bill Introduced.—S. 351, proposes to prohibit the performance of any **lobotomy, topectomy, or transorbital operation, or any brain operation** designed to alleviate a functional disorder, unless the hospital staff has, by a two-thirds vote, approved the reasons for performing such operation.

Michigan

Bills Introduced.—H. 400, proposes the creation of a **Michigan State Board of Naturopathy** and defines naturopathy as that philosophy and practice of the healing art which embodies a complete physianthrophy and diagnosis, and which for therapeutic purposes employs nature's agencies, forces, processes and products, excepting major surgery and x-ray and radium for treatment purposes. Licentiates would be entitled to practice naturopathy in the State of Michigan as taught in the accredited schools and colleges of naturopathy. H. 453, proposes that except as otherwise provided by law, no **autopsy**, post-mortem or dissection shall be performed upon the body of a deceased person except **by a licensed physician** who has been granted written consent therefor by which ever of the following assumes custody of the body for purposes of burial: father, mother, husband, guardian, next of kin, or in the absence of any of the foregoing, a friend or a person charged by law with the responsibility for burial. S. 314, proposes the enactment of a Michigan **employee's disability benefit act.**

Mississippi

Bills Introduced.—H. 89, proposes to require each applicant for a marriage license to present a **certificate signed by a physician** licensed to practice medicine in the State certifying freedom from venereal disease. H. 149, proposes to define the crime of **abortion** as willfully and knowingly by means of any instrument, medicine, drug, etc., causing any woman pregnant with child to abort or miscarry or attempting to cure or produce an abortion or miscarriage, unless the same was done as necessary for the preservation of the mother's life. The proposal would also provide that no act shall be considered as necessary for the preservation of the mother's life unless upon the prior advice, in writing, of two reputable licensed physicians. H. 234, proposes to make it unlawful for an employer to require an employee or applicant for employment to pay the **cost of a medical examination** or the cost of furnishing any records required by the employer as a condition of employment. H. 346, proposes that no person other than a regularly licensed druggist shall trade in **marijuana** and that no druggist shall trade in it either except to a regularly licensed physician or upon the prescription of such physician, which prescription shall not be used more than once and shall not be refilled. H. 347, to amend the law regulating the **sale of barbiturates,** proposes that when a violation of the act is committed against a minor the person so convicted shall be sentenced to the penitentiary for a term of not less than one or more than five years. S. 151, proposes an appropriation to the state medical education board for the purpose of carrying out the provisions relating to the furnishing of **loans or scholarships** to bona fide citizens of Mississippi for securing a **medical education.**

Missouri

Bill Introduced.—H. 510, proposes an amendment to the **narcotic act** relating to the penalty for those who unlawfully sell narcotic drugs to minors.

New York

Bills Introduced.—A.R. 138, proposes the creation of a committee to make a thorough and complete study of the alleged **discriminatory action of medical schools** and colleges in the selection of students because of their race or color. A. 2052 and S. 2325, to amend the medical practice act, propose to make it **grounds for revocation of a license** that a physician, osteopath or physiotherapist has employed, hired, procured, induced, or aided or abetted a person not licensed to practice the aforesaid professions in this state to so practice. A. 2133, to amend the public health law proposes to require **physicians to immediately give notice** to the health officer of the county, city, town, or village where the person resides of every case of infantile paralysis under his care. A. 2198 and S. 1919, propose an appropriation to defray the cost of research to devise a program to control and prevent infantile paralysis. A. 2255, S. 1937 and S. 2199, to amend the civil service law, propose to authorize the state comptroller to contract with a nonprofit membership corporation for the purpose of furnishing **medical and surgical services** and hospital services to persons employed by the state. A. 2267 and S. 2005, propose regulations for the operation of **nurses registries.** A. 2270 and S. 2203, to amend the education law, propose regulations for the licensing of operators of **shoe fitting fluoroscopy apparatus.** A. 2277 and S. 1992, propose the creation of a state commission to make a study and survey of the prevalence and facilities for the treatment of all forms of **heart disease.** A. 2373, to amend the workmen's compensation law, proposes to **prohibit physicians** designated by the board to conduct special examinations **from examining,** treating, or prescribing for claimants. A. 2531, proposes the creation of a permanent **hospital survey and planning commission** for the state for the purpose of inventorying existing hospital facilities and carrying out construction programs for additional necessary hospitals. A. 2606, to amend the public health law, proposes to require the commissioner of public health to safely keep and preserve all **hospital records** for any public or private hospital which discontinued operations for any reason and which failed to arrange for the preservation of its records. A. 2636, to amend the public health law, proposes **to require physicians to report** to the state department of health promptly the name and if possible the address of any person under treatment if it appears that such person is an habitual user of any narcotic drug. S. 1753, to amend the penal law, proposes to make it unlawful for the trustees, superintendents and managers of nonsectarian hospitals to **refuse to employ physicians** or refuse to allow physicians or nurses to use the facilities of the hospital or to practice his profession therein because of race, color, creed, or religion. S. 1849, to amend the vehicle and traffic law, proposes to make it unlawful for any **habitual user of a narcotic drug** to operate a motor vehicle while under the influence of such drug. S. 1856, to amend the education law, proposes to permit an applicant for a license to practice **physiotherapy** to practice physiotherapy during the pendency of the granting or denial of such application. S. 1857, to amend the education law, proposes to authorize applicants for a license to practice **nursing** to practice their profession pending the granting or denial of such application. S. 1995, to amend the public health law, proposes to establish within the department of health an **adult hygiene and geriatrics** program to improve and protect the health and vitality of middle and elderly citizens in the state. S. 1997, proposes an appropriation for the purpose of conducting experiments, in cooperation with the medical society of New York State, in mass detecting of diseases in their early stages through the process of **multiphasic screening.** S. 2007, proposes an appropriation for the purpose of establishing an **experimental geriatric clinic.** S. 2118, proposes to authorize the board of medical examiners to regulate and license the practice of **corrective therapy** which term is defined as being synonymous to exercise therapy, corrective physical education, and physical reconditionings. S. 2178, to amend the education law, proposes to exempt from labeling provisions the sale of **proprietary drugs** except those **which are poisonous, habit forming** and/or because of their toxicity or other potentiality for harmful effect, or the method of their use, or the collateral measures necessary to their use, are not safe for use except under the supervision of a practitioner licensed by law to administer such medicines. S. 2216, proposes to require secondary schools to include instruction in the nature and effect on human system of **narcotic and habit-forming drugs.** S. 2416, proposes that in any case in which the state or political subdivision of the state contributes part or all of the costs for medical or dental indemnity or hospital service, the subscriber shall have the **right to select** for such expense indemnity or service any nonprofit **medical care plan** authorized and approved by the superintendent of insurance.

Rhode Island

Bill Introduced.—S. 132, proposes regulations for the licensing of **professional and practical nurses.**

South Carolina

Bill Introduced.—H. 1813, proposes the establishment of a **state board of health.**

Virginia

Bills Introduced.—H. 569, proposes regulations for the licensing of **ophthalmic dispensers.** H. 651, proposes regulations for the awarding of **scholarships** for graduate instruction **in nursing.**

SUPPLEMENT AVAILABLE TO REVIEWS OF MEDICAL MOTION PICTURES

The Committee on Medical Motion Pictures has completed the 1951 supplement to the second revised edition of the booklet entitled "Reviews of Medical Motion Pictures." This supplement contains 90 reviews of medical and health films reviewed in THE JOURNAL from Jan. 1, 1951, through Dec. 31, 1951. Each film has been indexed according to subject matter. The purpose of these reviews is to provide a brief description and an evaluation of motion pictures that are available to the medical profession. Copies have been sent to the secretary of each of the state medical societies. Complimentary copies will be sent to county medical societies and other medical organizations on request.

MEDICAL NEWS

ALABAMA

Pediatric Society to Honor Dr. Alfred Walker.—The 28th annual meeting of the Alabama State Pediatric Society in Montgomery April 16 will be dedicated to Dr. Alfred A. Walker, Birmingham. The speakers will be Drs. Francis F. Schwentker, Baltimore, and William A. Reilly, San Francisco. Dr. Hughes Kennedy of Birmingham will give the address of tribute to Dr. Walker. Dr. Walker is emeritus professor of pediatrics at the Medical College of Alabama. He has been chairman of the Jefferson County Board of Health since 1933 and was a director of the American Board of Pediatrics from 1934 to 1944. All pediatricians and all of Dr. Walker's friends are invited to this meeting. Correspondence should be addressed to Dr. David B. Monsky, president of the Alabama State Pediatric Society, 732 Adams Ave., Montgomery.

CALIFORNIA

Dr. Sox Suceeds Dr. Geiger.—Dr. Ellis D. Sox has been named health director of the City of San Francisco and took over his duties Feb. 26. He left his position as chief of the division of local health service for the California State Department of Public Health. Dr. Sox has been health officer of Tulare County and joined the state health department some years ago on the recommendation of Dr. Geiger to study the health of migratory workers.

Personals.—Dr. Edwin B. McLean, formerly with Smith, Kline & French Laboratories in Philadelphia, has joined Cutter Laboratories, Berkeley, as director of clinical investigation.—— Dr. John C. Ruddock, a past president of the Los Angeles County Medical Association, and now medical director, Richfield Oil Corporation, Los Angeles, has been elected an honorary member of the Royal Society of Medicine of London, England, "in recognition of distinguished services to science."

COLORADO

Dr. Gordon Goes to Baltimore.—Dr. Harry H. Gordon, Denver, has been appointed full time chief-of-staff in pediatrics, effective Jan. 1 at Sinai Hospital in Baltimore, associate professor in pediatrics at the Johns Hopkins University School of Medicine, and pediatrician on the staff of Johns Hopkins Hospital. Dr. Gordon resigned as professor of pediatrics at the University of Colorado School of Medicine and as pediatrician-in-chief at the Colorado General and Denver General hospitals to accept these appointments.

Northeast Colorado Cancer Seminar.—A seminar on cancer, designed particularly for physicians of the northeast quarter of Colorado and southeast Wyoming, will be held April 6 in the Community Hospital at Fort Morgan. To sponsor the seminar the Northeastern Colorado Cancer Association has been created as an informal grouping of the Northeast Colorado Medical Society, the Morgan County Medical Society, and the Washington-Yuma Counties Medical Society. Interested physicians, regardless of residence or membership in any of these three component societies of Colorado, are invited to attend. There will be no registration fee. The following speakers, all from Denver, will appear on the program:

Emmett A. Mechler, Cancer of the Cervix and Uterus.
Harry W. LeFevre, Cancer of the Colon.
Kenneth D. A. Allen and John H. Freed, Cancer of the Breast from the Radiologists' Standpoint.
Karl F. Sunderland, Cancer of the Breast from the Surgeon's Standpoint.
Peter C. Hoch, Cancer in Childhood.
Henry M. Lewis, Cancer of the Skin.

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education and public health. Programs should be received at least three weeks before the date of meeting.

FLORIDA

Pharmacy Sells Both the Drug and the Prescription.—Conviction of a Jacksonville physician for aiding and abetting the violation of the Food, Drug and Cosmetic Act was reported by the Food and Drug Administration, Washington, D. C., Feb. 19. The physician, Dr. Roosevelt F. Mills, is said to have furnished a drug store with signed prescription blanks, which the pharmacists used for sales of sulfathiazole and penicillin to persons Dr. Mills did not know and who were not his patients. A Food and Drug Administration inspector investigating the practices of the Imperial Pharmacy in Jacksonville attempted to buy a "sulfa treatment" without a prescription and was told by one of the pharmacists that a prescription was required, but he could sell him both the drug and the prescription. The pharmacist filled in the inspector's name and other prescription data on one of the blanks signed by Dr. Mills and put a dollar for Dr. Mills in the same drawer with the signed blanks. By tracing other purchasers named on filed prescriptions signed by Dr. Mills, the inspectors found young men who testified before the jury to similar experiences when they had approached the pharmacists for venereal disease treatments. The drug store owner, L. S. Kilbee, and his pharmacists, J. S. Bernreuter and I. M. Seay, did not contest the illegal sales charges, which included sales of barbiturates without prescription. Judge Bryan Simpson fined all four persons after the jury verdict in the Mills trial was announced.

ILLINOIS

Meeting on Ophthalmology and Otolaryngology.—The annual convention of the Central Illinois Society of Ophthalmology and Otolaryngology will be held March 28-30 at the Abraham Lincoln Hotel in Springfield under the presidency of Dr. Grover C. Otrich, Belleville. Out-of-state speakers will be Dr. James B. Costen, St. Louis, who will speak on "Morphology of Tumors of the Larynx," and Dr. Trygve Gundersen, Boston, whose subject will be "Herpes Simplex Corneae." At the banquet Saturday evening, J. J. Miller, director of research and technology, J. R. Roerig and Company, Chicago, will speak on "Nutrition Relative to Ophthalmology."

Chicago

Memorial Addition to La Rabida Sanitarium.—A gift of $250,000 has been made to La Rabida Sanitarium in Jackson Park by Albert Pick, chairman of the Pick Hotels Corporation. The money will be used to construct a building adjacent to the rheumatic fever sanitarium as a memorial to Mr. Pick's first wife, who died in 1945. It will house health, home service, recreation, occupational therapy and educational activities for children. It is hoped the structure will be completed in 16 months.

Gift for Cancer Library.—A gift of $1,500 was made to the Chicago Medical School by the Bernice Kozin Memorial Foundation, the organization's first award since it was formed a little over a year ago to raise funds for cancer research in memory of the wife of Louis Kozin. The fund will be used to buy books on cancer research for the school, the collection to be known as the Bernice Kozin Memorial Cancer Library. Mr. Sol Miller, president of the foundation, says the plan is to make this an annual gift and to increase it during the coming years.

Psychiatric Unit for Children.—Michael Reese Hospital on Feb. 18 opened a child care unit in the Institute for Psychosomatic and Psychiatric Research and Training. Children between the ages of 6 and 12 years will be accepted for observation, diagnosis, evaluation, and therapy. They will be offered the benefit of psychiatric, pediatric, psychological, electroencephalographic, and other laboratory facilities for diagnosis. Specially trained personnel in nursing, occupational therapy, and teaching specialties are available as auxiliary therapists. Beds are avail-

able for private patients of recognized psychiatrists who will be in complete charge of their patients. These psychiatrists will have the full cooperation of the resident and full time auxiliary staff of the unit. Patients with psychosomatic disorders must be under the joint care of a pediatrician and a child psychiatrist.

KANSAS

National Heart Institute Fellowship.—The National Heart Institute has awarded a fellowship in cardiovascular disease to Dr. T. K. Lin for his further study at the University of Kansas Medical Center under Dr. E. Grey Dimond, director of the cardiovascular laboratory. This is the first such fellowship to be awarded to a doctor for postgraduate study at the Kansas University Medical Center. The fellowship carries a $300 a month stipend.

LOUISIANA

Business Men Honor Dr. Matas.—The Young Men's Business Club of New Orleans dedicated a monument Jan. 20 at Charity Hospital, New Orleans. The ceremony was in commemoration of the victory of medical science over yellow fever and in honor of Dr. Rudolph Matas, emeritus professor of surgery at Tulane University of Louisiana School of Medicine, New Orleans.

Personals.—Drs. Edmund M. Connelly and Charles S. Holbrook, psychiatrists of New Orleans, were honored at the annual staff banquet of the DePaul Sanitarium on Jan. 28, when they were presented with a plaque for distinguished and meritorious services to the institution throughout the many years since they became members of the staff. Dr. Connelly was doubly honored by receiving also a certificate and gold key from the city for the manner in which he has conducted the affairs of the City Hospital for Mental Diseases as its director.——Dr. George L. Gardiner Sr. will be the guest of honor at the first homecoming program of Gueydan High School March 19. The doctor has been practicing in Gueydan since 1915.

MARYLAND

Mount Sinai Hospital Alumni.—All former members of the house staff of the Sinai Hospital in Baltimore are requested to send their present addresses to the Office of the Director, Sinai Hospital, Baltimore.

Civil Defense Appointment.—Brig. Gen. Robert P. Williams has been appointed state deputy director of Health Services for Civil Defense to serve with Dr. Robert H. Riley, Baltimore, director, State Department of Health, and director of Health Services for Civil Defense. General Williams retired from the United States Army on Aug. 31, 1951, after 36 years of service. He is a physician who has had disaster experience during World War II and at Texas City in 1947.

MASSACHUSETTS

Tufts Alumni Association Meeting.—The Tufts Medical Alumni Association will hold its annual dinner meeting the evening of April 2 at the Somerset Hotel, Boston. The guest speaker will be Dr. Austin Smith, Chicago, Editor of THE JOURNAL, who will speak on "Modern Trends in Medicine." President Leonard Carmichael of Tufts College will talk on "Does New England Need State Supported Medical Schools?" Dr. Lawrence R. Dame of Greenfield, representing the 25-Year Class, will speak on "Medical Progress." Dr. Gordon M. Morrison, chairman of the dinner committee, will preside. The 25-Year Class will hold its reunion also on April 1 and 2. Preceding the dinner there will be open house at the medical school from 1 to 4 p. m.

MICHIGAN

Discussion on Industrial Health.—The University of Michigan School of Public Health, Ann Arbor, in collaboration with the Institute of Industrial Health and the school of medicine is offering a discussion on industrial health programs March 26 at the university. Out-of-state speakers include Dr. C. Richard Walmer, director of the Industrial Hygiene Foundation, Pittsburgh; Dr. Dudley A. Irwin of the Aluminum Company of America, Pittsburgh; and Dr. Seward Miller, director of the industrial hygiene division of the U. S. Public Health Service.

MINNESOTA

Annual Fahr and Duluth Clinic Lectures.—Dr. Robert E. Gross, William E. Ladd Professor of Child Surgery, Harvard Medical School, Boston, will deliver the annual George E. Fahr Lectureship at the University of Minnesota on April 8 at 8 p. m. on "Coarctation of the Aorta." Dr. Gross will also take part in a continuation course in surgery to be held at the Center for Continuation Study April 7-9.

Samuel R. M. Reynolds, Ph.D., physiologist, department of embryology, Carnegie Institution of Washington, will deliver the annual Duluth Clinic Lecture at the university April 18 on "Newer Concepts of Fetal Circulation." Dr. Reynolds will also take part in a continuation course on obstetrics for specialists in that field, to be held April 17-19.

NEW YORK

State Seeks School Physicians.—The state education department has two openings in Albany at a starting salary of $6,449 for doctors with experience as school physicians. The state civil service department is accepting applications from any qualified citizen of the United States. Applicants must have or be eligible for a New York State license to practice medicine, and have had two years of experience in the practice of medicine, including service as a school physician. The positions require much traveling. No written or oral examinations will be given. Candidates will be rated on their education and professional experience. Information may be secured from the State Department of Civil Service, State Office Building, Albany. Applications will be accepted for an indefinite period.

New York City

Society News.—Officers for the Brooklyn Urological Society for the year 1952 are Dr. Andrew J. McGowan, Ozone Park, president; Dr. Perry Katzen, Brooklyn, vice-president, and Dr. Miles W. Thomley, Brooklyn, secretary-treasurer.——At the March 27 meeting of the Kings County Radiological Society Dr. Jacob Buckstein will speak on "Tumors of the Duodenum, Jejunum and Ileum."

Annual Herter Lecture.—Dr. Arnold D. Welch, professor and director of the department of pharmacology, Western Reserve University School of Medicine, Cleveland, delivered the 48th annual Christian A. Herter Lecture Feb. 19 at the New York University College of Medicine on "Biochemical Advances in Our Knowledge of Pernicious Anemia."

Janeway Lecture at Mount Sinai Hospital.—Dr. Sidney Farber, professor of pathology at Harvard Medical School, Boston, and scientific director of the Children's Cancer Research Foundation, will deliver the Edward G. Janeway Lecture at Mount Sinai Hospital, New York, March 31 at 8:30 p. m. in Blumenthal Auditorium on "Current Research in the Chemotherapy of Cancer."

Symposium on Corticotropin and Cortisone.—This symposium is to be held by the section on microbiology of the New York Academy of Medicine on March 27-28 at the New York Academy of Medicine. Contributors to the symposium are as follows:

Metabolism, Frank L. Engel, Durham, N. C.
Enzymatic Reactions in Rat Tissues, Wayne W. Umbreit, Ph.D., Rahway, N. J.
Lymphoid Tissue, William E. Ehrich, Philadelphia.
Loose Connective Tissue, Charles A. Ragan Jr., New York.
Antigen-Antibody Reactions, Edward E. Fischel, New York.
Resistance to Infections and Tumor Grafting, Herbert C. Stoerk, Rahway, N. J.
Bronchial Asthma and Drug Idiosyncrasy, A. McGehee Harvey, Baltimore.
Toxins and Experimental Streptococcus Hemolyticus, Lewis Thomas, Minneapolis.
Spontaneous Trypanosomiasis, Abner Wolf, New York.
Experimental Poliomyelitis, Gregory Shwartzman, New York.
Bacterial Infections and Malaria, Maxwell Finland, Boston.
Tuberculosis, Max B. Lurie, Philadelphia.
Infections of the Eye, Alan C. Woods, Baltimore.
Experimental Syphilis, Thomas B. Turner, Baltimore.

The meetings are open to all who are interested.

PENNSYLVANIA

Graduate Education Institute.—The spring session of the fifth annual Graduate Education Institute under the auspices of the Medical Society of the State of Pennsylvania will open in nine teaching centers throughout the state early in March with a variety of subjects covered by a teaching staff from the medical schools of Philadelphia and Pittsburgh. One day a week for five weeks lectures will be presented from 9 a. m. to 12 noon and from 1 p. m. to 4 p. m. on certain days in different centers. The centers include Allentown, Butler, Clearfield, Harrisburg, Johnstown, Lancaster, Scranton, Washington, and Williamsport. This graduate education is aimed to save the general practitioner time and expense by bringing the instruction near his home. More than 400 Pennsylvania physicians have already received certificates for having attended 70% of the lectures over a period of three years. All those taking these courses may use the credit in meeting the postgraduate education requirement of the American Academy of General Practice.

Philadelphia

Course in Diseases of the Chest.—This course, sponsored by the American College of Chest Physicians and the Laennec Society of Philadelphia, will be given March 24-28 at the Warwick Hotel in Philadelphia. In addition to speakers from Philadelphia, the following out-of-state speakers will present papers:

Mr. William Steenken Jr., Saranac Lake, N. Y., Streptomycin in Experimental Tuberculosis.
Nicholas D'Esopo, Sunmount, N. Y., Changing Streptomycin Regimens.
Capt. Robert Bruce Brown, MC, USN, Bethesda, Md., Post-Traumatic Thorax.
Coleman B. Rabin, New York, Pathology of Bronchopulmonary Tumors with Particular Reference to Adenoma.

Student General Practice Society.—Undergraduates of the University of Pennsylvania School of Medicine have set up a new medical organization, known as The General Practice Society, which reasserts the traditional ideals of the "family doctor" and emphasizes the basic role of the general practitioner as the keystone of the medical profession. More than 75 medical undergraduates at Pennsylvania have signed up for active membership. The society, according to its founders, will function primarily in the stimulation of interest in general practice, will seek to locate members in internships, residencies, and opportunities for general practice, and will promote a mutually beneficial liaison between itself and the organized specialty societies. Meetings will be held once a month to hear speakers, see appropriate motion pictures, and listen to panel discussions. Membership is open to all medical undergraduates at Pennsylvania.

TEXAS

Society News.—At the meeting of the Central Texas Journal Club at Waco on Feb. 6, Dr. S. Edward Sulkin, professor of bacteriology, spoke on "The Coxsackie Viruses—Their Role in Human Infection."

Personal.—Charles M. Pomerat, Ph.D., professor of cytology and director of the tissue culture laboratory, University of Texas Medical Branch, Galveston, will visit European cytological research centers during March, April, and May for the purpose of reporting advances in tissue culture study and of correlating European contributions in the field. Dr. Pomerat will visit medical laboratories in Paris, Milan, Zurich, Basel, Strasburg, and Cambridge, England.

Guest Lecturers at the Medical Branch.—The following speakers will be guest lecturers at the University of Texas Medical Branch, Galveston. On March 26-28 Paul Weiss, Ph.D., professor of zoology and director of the division of biology of the University of Chicago, will describe studies on mechanisms of nerve growth and of protoplasmic synthesis. He will also discuss patterns of coordination. Dr. Stuart Mudd, professor of microbiology of the University of Pennsylvania, Philadelphia, will address staff and students and invited guests March 31 on "Microorganisms as Parasites and as Hosts."

M. F. Ashley Montagu, Ph.D., of the anthropology department of Rutgers University, New Brunswick, N. J., will speak on "Maternal Deprivation and Problems of Personality" on April 1.

VIRGINIA

Stoneburner Lectures and Symposium on Diabetes Mellitus.—Dr. Garfield G. Duncan, clinical professor of medicine, Jefferson Medical College of Philadelphia, will deliver the fifth annual Stoneburner lecture series at the Medical College of Virginia, Richmond. The first lecture will be at 8:30 p. m. March 19 on "Management of Diabetes Mellitus," and the second lecture at the same time March 20 will be on "Consideration of the Undernourished Patient."

A symposium on diabetes mellitus and nutrition will be held in the auditorium March 20-21. Out-of-state speakers and the subjects of one of their papers are as follows:

Alfred E. Wilhelmi, Ph.D., Atlanta, Carbohydrate Metabolism.
Henry T. Ricketts, Chicago, Serum Lipids and Atherosclerosis.
Priscilla White, Boston, Diabetes in Childhood.
John B. McKittrick, Boston, Evaluation of Lower Extremity Lesions in the Patient with Diabetes Mellitus.
J. Russell Elkinton, Philadelphia, Fluid Therapy in Diabetic Acidosis.
Stefan S. Fajans, Ann Arbor, Mich., Hypoglycemia.
John B. Youmans, Nashville, Tenn., Vitamins and Special Diets.

The lectures were established in 1946 in memory of Captain Lewis T. Stoneburner III, MC, AUS, by his comrades at the 45th General Hospital. There is no charge for the lectures themselves. There will be a charge of $5 a day for the symposium lectures March 20 and 21, except to members of the faculty of the Medical College of Virginia, the Medical Department of the University of Virginia, the physicians of the McGuire Veterans Hospital, medical students, and members of the house staff of any hospital.

WEST VIRGINIA

State Tuberculosis Rate Below National Average.—For the first time in history the West Virginia death rate from tuberculosis was below the national average in 1950, the state rate being 21.3% as against 22.6% for the nation. Records in the State Department of Health show that in 1951 only one-half as many people (350) died from tuberculosis as in 1947. This information is compiled from tentative figures received by the department.

State Health Department in New Offices.—Most divisions and bureaus of the state department of health were moved from the Capitol Building to the new state office building on East Washington Street in Charleston Feb. 1. The only units of the department that have not been moved are the state hygienic laboratory on McClung Street, the industrial hygiene laboratory on East Washington Street, the West Virginia Training Center for public health nurses and sanitarians, and the health information center, which are both located at the West Virginia Medical Center in South Charleston. According to Dr. Newman H. Dyer, state director of health, it is not practicable at this time to house these services in an office building owing to the nature of the work involved. He stated that, for the first time in 10 years, most of the divisions and bureaus of the department are now in one building.

WISCONSIN

Dr. W. B. Youmans to Head Department.—Dr. William B. Youmans, Portland, Ore., has been named chairman of the department of physiology at the University of Wisconsin Medical School, Madison. Dr. Youmans comes to the university from a similar post at the University of Oregon. The university is to lose the services of Dr. John A. E. Eyster, present department chairman, and Walter J. Meek, D.Sc., through retirement. Dr. Youmans had been instructor at the University of Oregon Medical School in 1938 and became head of the department of physiology in 1945. The regents approved appointment of 11 members of the Madison Veterans Administration Hospital as assistant clinical professors. Appointed were Dr. Robin N. Allin, Dr. Mark A. Foster, Dr. Anthony J. Richtsmeier, Dr. Arvin B. Weinstein, and Dr. James M. Wilkie, department of medicine; Dr. Benjamin I. Brindley, otolaryngology; Dr. Frederick G. Joachim, surgery; Dr. Palmer R. Kundert, urology; Dr. Sion C. Rogers, orthopedic surgery; Dr. Henry M. Suckle, neurosurgery; and Dr. William C. Lewis, neuropsychiatry.

GENERAL

Change Name of Society.—The name of the Association for the Study of Internal Secretions has been officially changed to The Endocrine Society. The change was made at the annual meeting in Atlantic City June 9, 1951, and became effective Jan. 1. The name of the *Journal of Clinical Endocrinology* has been changed to the *Journal of Clinical Endocrinology and Metabolism.*

Industrial Worker's Life Span Increased 20%.—Longevity among American wage earners and their families increased to a new high in 1951, with expectation of life at birth rising to 68.5 years, according to Louis I. Dublin, Ph.D., chief statistician of the Metropolitan Life Insurance Company. This is a gain of about one-fifth of a year over the 1950 figure. Since the latter part of the 19th century, expectation of life at birth has doubled in the industrial population. Among Metropolitan's industrial policyholders, average length of life has increased by five years in the past decade, and by 10 years since the early 1930's. The gains are attributed by Dr. Dublin to more healthful living and working conditions, better food, and to the outstanding gains in medical science and public health administration.

Easter Seal Campaign for the Crippled.—On March 13 the 19th annual Easter Seal Campaign will be launched by the National Society for Crippled Children and Adults and its affiliates in the 48 states, the District of Columbia, Alaska, Hawaii, and Puerto Rico. The campaign closes Easter Sunday, April 13. Direct services to more than 300,000 crippled children and adults are being given this year as the result of Easter seal contributions in the form of treatment and training, convalescent care, special education, recreation, employment opportunities, and counseling. Over 90% of the funds raised in the annual Easter seal appeal remain in the communities where they are collected, only 8.3% going to the national society for its national program of education, research, and service.

Orthopedic Surgeons Exhibit Awards.—The gold medal awards of the American Academy of Orthopaedic Surgeons for the best exhibits at the meeting in Chicago, Jan. 26-31, have been given as follows: Dr. Alfred R. Shands Jr., Col. Knox Dunlap, MC, USA, and Maj. Lucius C. Hollister, MC, USAF, Wilmington, Del., received the award for research for scientific value on an exhibit entitled "Technique for Determination of Torsion of Femur." For the best exhibit on clinical application the gold medal was given to Drs. Abel Kenin and Melvin H. Jahss, New York, for their exhibit entitled "Clinical and Pathological Follow-Up of 208 Cases of Epiphysiolysis—1 to 28 Year Follow-Up." Dr. Frederick Lee Liebolt, New York, received the gold medal for originality in presentation of his exhibit "Injuries to the Menisci of the Knee Joint."

World Health Seals.—Ten countries have declared their intention to participate in sales campaigns for "World Health Seals," which will be sold this year for the first time to promote national health programs. This announcement was made Jan. 22 by the executive board of the World Health Organization in reviewing action taken on the World Health Assembly decision of last year. The seals, depicting the Palais des Nations, WHO Headquarters, and the WHO emblem, will be put on sale on World Health Day, April 7. The proceeds will be divided between WHO and the government of the state in which seals are sold, the government retaining 75% for its health programs and WHO receiving 25%, which will be paid into a special fund to finance further issues of seals. The board learned that 26 countries will not participate this year, while 43 others had not yet made a decision.

Tuberculosis Research Grants and Fellowships.—Twenty-five grants to aid medical research projects in tuberculosis and 11 research and teaching fellowships have been approved by the board of directors of the National Tuberculosis Association for the fiscal year beginning April 1. Both the grants and fellowships were recommended by the Committee on Medical Research of the association's medical section, the American Trudeau Society. Dr. David T. Smith of Durham, N. C., is chairman of the committee. The number of investigations and the six classifications into which they fall are as follows: bacteriology and chemistry of the tubercle bacillus, six; anatomy and physiology of the lung, five; pathology and immunology of tuberculosis, eight; experimental chemotherapy, one; clinical treatment of tuberculosis, three, and epidemiology of tuberculosis and related diseases, two.

College of Allergists Annual Meeting.—The annual congress of the American College of Allergists, will be at the Hotel William Penn, Pittsburgh, April 7-9, under the presidency of Dr. Harold A. Abramson, New York. The meeting will be preceded by a graduate instructional course in allergy April 4-6. The following physicians will present papers by invitation:

Horace S. Baldwin, New York, Place of the Allergist in Medical Education and Public Welfare.
Samuel M. Feinberg, Chicago, Allergy to Drugs.
Miss Syril Bruskin, M.A., Survey of Incidence of Fungus Spores in the New Brunswick Area.
Leo H. Criep, Pittsburgh, Regional Factors in Allergic Disease.

The guest speaker on Tuesday morning's program will be Dr. Alexander S. Wiener, New York, on "The Solution of Certain Fundamental Immunologic Problems by Studies of Rh Sensitization." Section meetings will be held Tuesday afternoon on psychosomatic, pediatric, dermatological, otolaryngological, and industrial allergy. There will be an informal banquet and dancing at 7 p. m. Tuesday.

Medical Research Awards.—At the annual meeting of the National Society for Medical Research in Chicago, Feb. 10, the board of directors voted awards to three persons and two newspapers for outstanding service to medical science. Decorative plaques will be given to Dr. William H. Bachrach of the University of Southern California, Los Angeles, for his assistance to the Southern California Society for Medical Research in its campaign to have unclaimed dogs saved for teaching and research activities. Another plaque will go to Mr. Leo Brown, now director of the department of public relations of the American Medical Association, Chicago, for his educational and organizational activities as executive secretary of the Medical Society of the State of Pennsylvania. He was especially commended for the study outline, "How Will Biological-Medical Research Help Me To Live Longer," which is now a part of the curriculum of Pennsylvania secondary schools. Dr. John R. Paine, head of the department of surgery at Buffalo General Hospital, will be honored for leadership in the program that resulted in Buffalo's city council providing for use of unclaimed animals for medical research. The two papers cited by the board were the *Chicago Tribune* and *Chicago Sun-Times* for their coverage and support in matters of the use of animals in medical studies and the procurement of dogs for those studies. Officers elected are Anton J. Carlson, Ph.D., Chicago, president, and Dr. Andrew C. Ivy, Chicago, secretary-treasurer.

FOREIGN

CARE to Establish Iron Lung Banks in Asia.—American public support of urgent health needs in various areas abroad has been undertaken by the Cooperative for American Remittances to Europe, Inc. The first part of the program, organized at the request of the World Health Organization, will be to establish three iron lung banks in Asia at a cost of $60,000. Thirty iron lungs to be purchased will be given to three hospital centers in Tokyo, Bangkok, and a Middle Eastern city, probably Cairo. The representatives and trained personnel will be sent from the nearest center into any country stricken by an epidemic of poliomyelitis. Japan, which now averages 30,000 cases a year with a mortality rate of 25%, has no hospital equipped with an iron lung. Contributions will be accepted at CARE headquarters, 20 Broad St., New York, or at its local offices.

Health and Tuberculosis Conference in London.—A conference arranged by the National Association for the Prevention of Tuberculosis will be held in London July 8-13. It is open to all interested in preventive medicine, including the medical and veterinary professions, commercial and industrial executives, nurses, social workers, health administrators, members of public authorities, and regional hospital boards. At the last conference in 1949 over a thousand delegates from 50 countries were present.

Subjects for discussion include protective vaccination, contemporary ideas in the management of the tuberculous patient,

the social worker and the tuberculous family, the patient in industry, and tuberculosis in British Colonial territories. Among the speakers, according to the preliminary program, will be Dr. George C. Brink, department of health, Ontario, Canada; Dr. W. D. W. Brooks, St. Mary's Hospital, London; J. H. Carver, F.R.C.S., Hammersmith Hospital, London; A. L. D'Abreu, O.B.E., F.R.C.S., thoracic surgeon, Birmingham United Hospitals; Dr. B. A. Dormer, chief tuberculosis officer, Union of South Africa; Dr. C. M. Fletcher, pneumoconiosis research unit, M.R.C.; Prof. F. R. G. Heaf, Welsh National School of Medicine; Dr. L. E. Houghton, Harefield Hospital, Middlesex; Dr. J. B. McDougall, C.B.E., World Health Organization; Prof. R. Neubauer, Yugoslavia; Dr. F. Ridehalgh, F.R.C.P., Churchill Hospital, Oxford; T. Holmes Sellors, D.M., F.R.C.S., thoracic surgeon, Middlesex Hospital, London, and Dr. J. Greenwood Wilson, medical officer of health, City of Cardiff. A new feature of the conference will be special smaller gatherings for those with a particular interest, whether doctors, nurses, public health officials, or social workers, at which appropriate subjects will be discussed. Information can be obtained from the NAPT, Tavistock House North, Tavistock Square, London, W.C.1.

MEETINGS

AERO MEDICAL ASSOCIATION, Hotel Statler, Washington, D. C., March 17-19. Dr. Thomas H. Sutherland, 214 South State St., Marion, Ohio, Secretary.

ALABAMA, MEDICAL ASSOCIATION OF THE STATE OF, Montgomery, April 17-19. Dr. Douglas L. Cannon, 519 Dexter Ave., Montgomery, Secretary.

AMERICAN ACADEMY OF FORENSIC SCIENCES, Biltmore Hotel, Atlanta, Ga., March 6-8. Prof. Ralph F. Turner, Michigan State College Dept. of Police Administration, East Lansing, Mich., Secretary.

AMERICAN ACADEMY OF GENERAL PRACTICE, Atlantic City, N. J., March 24-27. Mr. Mac F. Cahal, 406 West 34th St., Kansas City 2, Mo., Executive Secretary.

AMERICAN ACADEMY OF OBSTETRICS AND GYNECOLOGY, Cincinnati, April 1. Dr. Ralph A. Reis, 116 South Michigan Boulevard, Chicago 3, Secretary.

AMERICAN ACADEMY OF NEUROLOGY, Brown Hotel, Louisville, Ky., Apr. 24-25. Dr. Francis M. Forster, 3800 Reservoir Rd. N.W., Washington, D. C., Secretary.

AMERICAN ASSOCIATION OF ANATOMISTS, Providence, R. I., March 19-21. Dr. Normand L. Hoerr, 2109 Adelbert Road, Cleveland 6, Secretary.

AMERICAN ASSOCIATION OF IMMUNOLOGISTS, New York, April 14. Dr. John Y. Sugg, 1300 York Ave., New York, Secretary.

AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, Cincinnati, April 21-24. Dr. Edward C. Holmblad, 28 E. Jackson Blvd., Chicago 4, Managing Director.

AMERICAN ASSOCIATION OF PATHOLOGISTS AND BACTERIOLOGISTS, New York, April 10-12. Dr. Alan R. Moritz, 2085 Adelbert Road, Cleveland 6, Secretary.

AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Drake Hotel, Chicago, April 1-3. Dr. Chester C. Guy, 5800 Stony Island Ave., Chicago 37, Secretary.

AMERICAN COLLEGE OF ALLERGISTS, William Penn Hotel, Pittsburgh, April 7-9. Dr. Fred W. Wittich, 423 LaSalle Medical Bldg., Minneapolis 2, Secretary.

AMERICAN COLLEGE OF PHYSICIANS, Cleveland, April 21-25. Mr. E. R. Loveland, 4200 Pine St., Philadelphia 4, Executive Secretary.

AMERICAN COLLEGE OF SURGEONS, SECTIONAL MEETINGS:

Minneapolis, Radisson Hotel, March 24-26. Dr. Harvey Nelson, 78 South 9th St., Minneapolis 2, Chairman.

Tucson, Ariz., Pioneer Hotel, April 7-9. Dr. Meade Clyne, 110 South Scott St., Tucson, Chairman.

Vancouver, B. C., Vancouver Hotel, March 31-April 4. Dr. J. Russell Neilson, 925 West Georgia St., Vancouver, B. C., Chairman.

AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY, Netherlands-Plaza Hotel, Cincinnati, March 31-April 4. Dr. Luella E. Nadelhoffer, 116 South Michigan Ave., Chicago 3, Secretary.

AMERICAN DERMATOLOGICAL ASSOCIATION, Broadmoor Hotel, Colorado Springs, Colo., Apr. 23-26. Dr. Louis A. Brunsting, 102 Second Ave. S.W., Rochester, Minn., Secretary.

AMERICAN HEART ASSOCIATION, Hotel Statler, Cleveland, April 17-20. Dr. Willian H. Bunn, 1775 Broadway, New York 19, Secretary.

AMERICAN PSYCHOSOMATIC SOCIETY, Chicago, March 29-30. Dr. Frederick C. Redlich, 551 Madison Avenue, New York 22, Secretary.

AMERICAN SOCIETY FOR EXPERIMENTAL PATHOLOGY, New York, April 14-18. Dr. Russell L. Holman, 1542 Tulane Ave., New Orleans 12, Secretary.

AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS, Hotel Statler, New York, April 14-18. Dr. Carl C. Pfeiffer, 1835 W. Polk St., Chicago 12, Secretary.

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS, New York, April 14-18. Dr. Elmer H. Stotz, 260 Crittenden Blvd., Rochester, N. Y., Secretary.

AMERICAN SURGICAL ASSOCIATION, White Sulphur Springs, W. Va., Apr. 16-18. Dr. Nathan A. Womack, University Hospitals, Iowa City, Secretary.

ARIZONA MEDICAL ASSOCIATION, Phoenix, April 30-May 3. Dr. Frank J. Milloy, 15 E. Monroe St., Phoenix, Secretary.

ARKANSAS MEDICAL SOCIETY, Little Rock, April 21-23. Dr. William R. Brooksher, 215 Kelley Bldg., Fort Smith, Secretary.

CALIFORNIA MEDICAL ASSOCIATION, Biltmore Hotel, Los Angeles, April 27-30. Dr. Albert C. Daniels, 450 Sutter St., San Francisco 8, Secretary.

CONNECTICUT STATE MEDICAL SOCIETY, Hartford, April 29-May 1. Dr. Creighton Barker, 160 St. Ronan Street, New Haven, Secretary.

FLORIDA MEDICAL ASSOCIATION, Hollywood, April 27-30. Dr. Samuel M. Day, P. O. Box 1018, Jacksonville, Secretary.

IOWA STATE MEDICAL SOCIETY, Des Moines, April 28-30. Dr. Allan B. Phillips, 406 Sixth Avenue, Des Moines 9, Secretary.

JOHN A. ANDREW CLINICAL SOCIETY, Memorial Hospital, Tuskegee Institute, Ala., April 6-12. Dr. Eugene H. Dibbie Jr., Memorial Hospital, Tuskegee Institute, Secretary.

KANSAS MEDICAL SOCIETY, Town House, Kansas City, April 27-May 1. Dr. Dale D. Vermillion, 512 New England Bldg., Topeka, Secretary.

LOUISIANA STATE MEDICAL SOCIETY, Shreveport, April 28-30. Dr. C. Grenes Cole, 1430 Tulane Ave., New Orleans 12, Secretary.

MARYLAND, MEDICAL AND CHIRURGICAL FACULTY OF THE STATE OF, Baltimore, April 28-30. Dr. George H. Yeager, 1211 Cathedral St., Baltimore 1, Secretary.

MICHIGAN CLINICAL INSTITUTE, Book-Cadillac Hotel, Detroit, March 12-14. Dr. E. F. Sladek, 606 Townsend St., Lansing 15, Chairman.

MID-CONTINENT PSYCHIATRIC ASSOCIATION, President Hotel, Kansas City, Mo., April 26-27. Dr. Paul Hines, 2625 W. Paseo, Kansas City, Mo., Secretary.

MISSOURI STATE MEDICAL ASSOCIATION, Hotel Jefferson, St. Louis, March 30-April 2. Dr. H. E. Petersen, 634 North Grand Blvd., St. Louis 3, Secretary.

NEW ORLEANS GRADUATE MEDICAL ASSEMBLY, Municipal Auditorium, New Orleans, March 10-13. Dr. Woodward D. Beacham, 1430 Tulane Ave., Room 105, New Orleans 12, Secretary.

NORTH PACIFIC SOCIETY OF INTERNAL MEDICINE, Portland, Ore., March 22. Dr. R. L. King, 1115 Terry Ave., Seattle 1, Secretary.

PIEDMONT PROCTOLOGIC SOCIETY, Charlotte, N. C., March 29-30. Dr. B. Richard Jackson, 224 Hillsboro St., Raleigh, N. C., Secretary.

POST GRADUATE INSTITUTE OF THE PHILADELPHIA COUNTY MEDICAL SOCIETY, Bellevue-Stratford Hotel, Philadelphia, April 1-4. Dr. Thomas M. Durant, 301 South 21st St., Philadelphia 3, Director.

SOUTHEASTERN ALLERGY ASSOCIATION, Bon Air Hotel, Augusta, Ga., March 21-22. Dr. Katharine B. MacInnis, 1515 Bull St., Columbia 49, S. C., Secretary.

SOUTHEASTERN SECTION, AMERICAN UROLOGICAL ASSOCIATION, Boca Raton, Fla., April 2-5. Dr. Russell B. Carson, Sweet Bldg., Fort Lauderdale, Fla., Secretary.

SOUTHEASTERN SURGICAL CONGRESS, Atlanta, Ga., March 10-13. Dr. Benjamin J. Beasley, 701 Hurt Bldg., Atlanta 3, Ga., Secretary.

TENNESSEE STATE MEDICAL ASSOCIATION, Andrew Johnson Hotel, Knoxville, April 7-9. Mr. V. O. Foster, 504 Doctors Bldg., Nashville 3, Executive Secretary.

UNITED STATES-MEXICO BORDER PUBLIC HEALTH ASSOCIATION, Monterrey, Nuevo Leon, Mexico, March 17-19. Dr. J. C. Ellington, 314 U. S. Court House, El Paso, Texas, Secretary.

INTERNATIONAL

AUSTRALASIAN MEDICAL CONGRESS, Melbourne Victoria, Australia, Aug. 22-30. Dr. C. H. Dickson, Medical Society Hall, 426 Albert St., East Melbourne, Victoria, Australia, Hon. General Secretary.

COMMONWEALTH AND EMPIRE HEALTH AND TUBERCULOSIS CONFERENCE, Central Hall, London, England, July 8-13. Dr. J. H. Harley Williams, Tavistock House North, Tavistock Sq., London, W.C.1, England, Secretary General.

CONGRESS OF THE INTERNATIONAL DIABETES FEDERATION, Leyden, Netherlands, July 7-12. Dr. F. Gerritzen, 33, Prinsegracht, The Hague, Netherlands, Secretary.

EUROPEAN CONGRESS OF CARDIOLOGY, University of London, Bloomsbury, W.C.1, England, Sept. 10-12. Dr. K. Shirley Smith, 35 Wimpole St., London, W.1, England, Secretary.

EUROPEAN SOCIETY OF CARDIOVASCULAR SURGERY, Strasbourg, France, Oct. 3-4. Sir James Learmonth, Department of Surgery, University New Buildings, Edinburgh 8, Scotland.

INTERAMERICAN CARDIOLOGICAL CONGRESS, Buenos Aires, Argentina, Aug. 31-Sept. 7. Dr. Blas Moia, Larrea 1132, Buenos Aires, Argentina, Secretary-General.

INTER-AMERICAN CONGRESS OF PUBLIC HEALTH, Havana, Cuba, Sept. 27-Oct. 1. Pan-American Sanitary Bureau, 2001 Connecticut Ave., Washington, D. C.

INTER-AMERICAN CONGRESS OF RADIOLOGY, Mexico City, Mexico, Nov. 2-6 Dr. Guido Torres Martinez, Marsella No. 11, Mexico, D.F., Secretary-General.

INTERNATIONAL COLLEGE OF SURGEONS, Madrid, Spain, May 20-24. Dr. Max Thorek, 850 West Irving Park Road, Chicago, Ill., U. S. A., Secretary-General.

INTERNATIONAL CONGRESS OF COMPARATIVE PATHOLOGY, Madrid, Spain, May 4-11. Prof. Carda-Aparici, Calle Fernando VI.8, Madrid, Spain, Secretary.

INTERNATIONAL CONGRESS OF DERMATOLOGY AND SYPHILOLOGY, London, England, July 21-26. Dr. Gordon B. Mitchell-Heggs, 5, Lisle St., London, W.C.2, England, General Secretary.

INTERNATIONAL CONGRESS ON DIABETES, Leyden, The Netherlands, July 7-12. Dr. F. Gerritzen, 33, Prinsegracht, The Hague, Netherlands.

INTERNATIONAL CONGRESS ON DISEASES OF THE CHEST, Rio de Janeiro, Brazil, Aug. 24-30. Mr. Murray Kornfeld, 112 East Chestnut St., Chicago 11, Illinois, Executive Secretary.

INTERNATIONAL CONGRESS OF HAEMATOLOGY, Mar del Plata, Argentina, Sept. 21-26. Dr. Carlos Reussi, Anchorena 1710, Buenos Aires, Argentina, Secretary.

INTERNATIONAL CONGRESS OF HEALTH TECHNICIANS, Palais de la Mutualite, Paris, France, June 9-14. Secretariat General, 6 Square Desaix, Paris XV^e^, France.

INTERNATIONAL CONGRESS OF INTERNAL MEDICINE, Friends House, London, N.W.1, Eng. Sept. 15-18. Sir Harold Boldero, 12 Pall Mall East, London, S.W.1, England, Secretary.

INTERNATIONAL CONGRESS ON MEDICAL RECORDS, London, England, Sept. 7-12. Miss Gwen Perkins, 120 C Street S.E., Washington, D. C., Chairman.

INTERNATIONAL CONGRESS ON NEUROPATHOLOGY, Rome, Italy, Sept. 8-13. Dr. Armando Ferraro, 722 W. 168th St., New York, N. Y., U. S. A., Secretary General.

INTERNATIONAL CONGRESS OF OTO-NEURO-OPHTHALMOLOGY, Lisbon and Estoril, Portugal, April 22-26. Prof. Diogo Furtado, Servico de Neurologia, Hospital dos Capuchos, Lisbon, Portugal, General Secretary.

INTERNATIONAL CONGRESS OF PHYSICAL MEDICINE, London, England, July 14-19. Dr. A. C. Boyle, 45, Lincoln's Inn Fields, London, W.C.2, England, Hon. Secretary.

INTERNATIONAL CONGRESS FOR THERMALISM AND CLIMATOTHALASSOTHERAPY, Nice-Cannes, France, April 3-8.

INTERNATIONAL SOCIETY OF GEOGRAPHIC PATHOLOGY, Liège, Belgium, July 15-18. Dr. Fred C. Roulet, Habelstr. 24, Basel, Switzerland, Secretary General.

INTERNATIONAL UNION AGAINST TUBERCULOSIS, Rio de Janeiro, Brazil, Aug. 24-27. Prof. Etienne Bernard, 66 Blvd. St. Michel, Paris 6e, France, Secretary-General.

NEURORADIOLOGIC SYMPOSIUM, Stockholm, Sweden, Sept. 17-20. Docent Ake Lindbom, Symposium Neuroradiologicum, Serafimerlasarettet, Stockholm K., Sweden, Secretary.

PAN-AMERICAN CONGRESS OF GASTROENTEROLOGY, Mexico City, D.F., May 11-17. Dr. R. Flores-Lopez, Calle Dr. Balmis, No. 148, Mexico City, D.F., Secretary.

PAN-EUROPEAN CONGRESS OF GASTROENTEROLOGY, Bologna, Florence and Rome, Italy, April 20-26. Prof. Guido Bassi, Policlinic of St. Orsola, Bologna, Italy, Secretary.

WORLD MEDICAL ASSOCIATION, Athens, Greece, Oct. 12-16. Dr. Louis H. Bauer, 2 East 103d St., New York 29, N. Y., Secretary General

EXAMINATIONS AND LICENSURE

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Examination.* Montgomery, June 24-26, 1952. Sec., Dr. D. G. Gill, 537 Dexter Ave., Montgomery 4.

ALASKA:* *Examination.* Juneau, March 4. Also on application in other towns where there are board members. *Reciprocity.* On application. Sec., Dr. W. M. Whitehead, Box 140, Juneau.

ARIZONA:* *Examingtion.* Phoenix, April 15-17. *Reciprocity.* Phoenix, April 19. Sec., Dr. J. H. Patterson, 316 W. McDowell St., Phoenix.

ARKANSAS:* *Examination. Regular.* Little Rock, June 5-6. Sec., Dr. Joe Verser, Harrisburg. *Homeopathic.* Little Rock, June 10-11. Sec., Dr. Carl S. Bungart, 105 N. 14th St., Fort Smith. *Eclectic.* Little Rock, June 5-6. Sec., Dr. Frank C. Smith, 2301 Broadway, Little Rock.

CALIFORNIA: *Written.* Los Angeles, Feb. 18-21; San Francisco, June 23-26; Los Angeles, Aug. 18-21; Sacramento, Oct. 20-23. Application must be received at least two weeks prior to date of examination. *Oral for Reciprocity Applicants.* San Francisco, June 21; Los Angeles, Aug. 16; San Francisco, Nov. 8. Applicants are requested not to arrange to come to an oral examination until they receive notice from the Credentials Committee. *Oral and Clinical for Foreign Medical School Graduates.* San Francisco, June 22; Los Angeles, Aug. 17; San Francisco, Nov. 9. Sec., Dr. Frederick N. Scatena, 1020 N St., Sacramento.

COLORADO:* *Examination.* Denver, June 10-12. Final date for filing application is May 12. *Reciprocity.* Denver, April 8. Final date for filing application is Mar. 10. Sec., Dr. Samuel H. Brown, 831 Republic Bldg., Denver.

CONNECTICUT:* *Regular Examination.* Hartford, March 11-12. Sec. to the Board, Dr. Creighton Barker, 160 St. Ronan St., New Haven. *Homeopathic Examination.* Derby, March 11. Sec., Dr. Donald A. Davis, 38 Elizabeth St., Derby.

DELAWARE: Dover, July 8-10. Sec., Dr. Joseph S. McDaniel, 229 South State St., Dover.

DISTRICT OF COLUMBIA:* *Reciprocity.* Washington, March 10. Sec., Dr. Daniel L. Seckinger, 4130 E. Municipal Bldg., Washington.

FLORIDA:* *Examination.* Jacksonville, June 29-July 1. Sec., Dr. Homer L. Pearson, 701 Dupont Bldg., Miami.

GEORGIA: Atlanta and Augusta, June. Sec., Mr. R. C. Coleman, 111 State Capital, Atlanta 3.

GUAM: The Commission on Licensure will meet whenever a candidate appears or submits his credentials. Ex. Sec., Dr. Austin W. Matthis, Agana.

IDAHO: Boise, July 14-16. Sec., Mr. Armand L. Bird, 305 Sun Bldg., Boise.

ILLINOIS: *Examination.* Chicago, April 1-3, June 24-26 and Oct. 7-9. Supt. of Regis., Mr. Charles F. Kervin, Capitol Bldg., Springfield.

INDIANA: Indianapolis, June 1952. Sec., Dr. Paul R. Tindall, 1138 K of P Bldg., Indianapolis 4.

IOWA:* *Examination.* Iowa City, June 9-11. Sec., Dr. M. A. Royal, 506 Fleming Bldg., Des Moines.

KANSAS: Kansas City, June 4-5. Sec., Dr. O. W. Davidson, 864 New Brotherhood Bldg., Kansas City.

KENTUCKY: *Examination.* Louisville, June 4-6. Sec., Dr. Bruce Underwood, 620 S. Third St., Louisville.

MAINE: Portland, March 11-12. Sec., Dr. Adam P. Leighton, 192 State St., Portland.

MARYLAND: *Examination.* Baltimore, June 17-20. Sec., Dr. Lewis P. Grundy, 1215 Cathedral St., Baltimore. *Homeopathic.* Baltimore, June 17-18. Sec., Dr. John A. Evans, 6029 Bellona Ave., Baltimore.

MICHIGAN:* *Examination.* June. Sec., Dr. J. E. McIntyre, 100 W. Allegan St., Lansing 8.

MINNESOTA: Minneapolis, April 15-17. Sec., Dr. Julian F. DuBois, 230 Lowry Medical Arts Bldg., St. Paul 2.

MONTANA: Helena, April 1. Sec., Dr. S. A. Cooney, 214 Power Block, Helena.

NEW HAMPSHIRE: Concord, March 12-13. Sec., Dr. John S. Wheeler, State House, Concord.

NEW JERSEY: *Examination.* Trenton, June 17-20. Sec., Dr. E. S. Hallinger, 28 W. State St., Trenton.

NEW MEXICO:* Santa Fe, April 14-15. Sec., Dr. Charles J. McGoey, Coronado Bldg., Santa Fe.

NORTH CAROLINA: *Reciprocity.* Pinehurst, May 5. *Written.* Raleigh, June 16-19; *Reciprocity.* Raleigh, June 17. Sec., Dr. Joseph J. Combs, 716 Professional Bldg., Raleigh.

NORTH DAKOTA: *Examination.* Grand Forks, July 9-11. *Reciprocity.* Grand Forks, July 12. Sec., Dr. C. J. Glaspel, Grafton.

OHIO: *Examination.* Columbus, June 17-20. *Reciprocity.* Columbus, April 1. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus 15.

OKLAHOMA:* *Examination.* Oklahoma City, June 4-5. Sec., Dr. Clinton Gallaher, 813 Braniff Bldg., Oklahoma City.

OREGON:* *Reciprocity.* Portland, April 18-19. *Examination.* Portland, July. Exec. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland.

PUERTO RICO: *Examination.* San Juan, March 4. Sec., Mr. Luis Cueto Coll, Box 3717, Santurce.

RHODE ISLAND:* *Examination.* Providence, April 3-4. Sec., Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH CAROLINA: *Reciprocity.* Columbia, March 3 and April 7. Sec., Dr. N. B. Heyward, 1329 Blanding St., Columbia.

SOUTH DAKOTA:* Rapid City, July 15. Sec., Dr. C. B. McVay, Yankton Clinic, Yankton.

TENNESSEE:* *Examination.* Memphis, March 26-27. Sec., Dr. H. W. Qualls, 1635 Exchange Bldg., Memphis.

TEXAS: Fort Worth, June 19-21. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth.

UTAH: *Examination.* Salt Lake City, July. Asst. Dir., Mr. Frank E. Lees, 314 State Capitol Bldg., Salt Lake City 1.

VIRGINIA: *Examination.* Richmond, June 12-14. *Reciprocity.* Richmond, June 11. Sec., Dr. K. D. Graves, 631 First St., S.W., Roanoke.

VIRGIN ISLANDS: St. Thomas, June 4-5. Sec., Dr. Earle M. Rice, St. Thomas.

WEST VIRGINIA: Charleston, April 7-8. Sec., Dr. H. H. Dyer, State Office Bldg. No. 3, Charleston 5.

WASHINGTON: Seattle, July. Sec., Mr. Edward C. Dohm, Department of Licenses, Olympia.

WISCONSIN:* Milwaukee, July 8-10. Sec., Dr. A. G. Koehler, 46 Washington Blvd., Oshkosh.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ALASKA: *Examination.* On application. Juneau or other towns in Territory as decided by Board. *Reciprocity.* On application. Sec., Dr. C. Earl Albrecht, Box 1931, Juneau.

ARIZONA: Tucson, March 18. Sec., Mr. Herbert D. Rhodes, University of Arizona, Tucson.

COLORADO: Denver, March 5-6. *Examination.* Sec., Dr. Esther B. Starks, 1459 Ogden St., Denver 18.

DISTRICT OF COLUMBIA: *Examination.* Washington, April 21-22. Sec., Dr. Daniel L. Seckinger, 4130 E. Municipal Bldg., Washington, D. C.

FLORIDA: Gainesville, June 7. *Examination.* Sec., Mr. M. W. Emmel, Box 340, University of Florida, Gainesville.

OKLAHOMA: *Examination.* Oklahoma City, April 14. Sec., Dr. Clinton Gallaher, 813 Braniff Bldg., Oklahoma City.

OREGON: *Examination.* Portland, March 1, June 7, Sept. 6 and Dec. 6. Sec., Dr. Charles D. Byrne, State Board of Higher Education, University of Oregon, Eugene.

TENNESSEE: *Examination.* Memphis and Nashville, March 20-21. Sec., Dr. O. W. Hyman, 874 Union Ave., Memphis.

TEXAS: Austin, April. *Examination.* Sec., Bro. Raphael Wilson, 306 Nalle Bldg., Austin.

WISCONSIN: *Examination.* Madison, April 5, and Milwaukee, June 7. Sec., Mr. W. H. Barber, Ripon College, Ripon.

* Basic Science Certificate required.

DEATHS

Du Puy, Howard Barham, Dallas, Texas; born in Tennessee Colony, Texas, Jan. 1, 1890; University of Texas School of Medicine, Galveston, 1917; member of the American Medical Association; fellow of the American College of Surgeons; during World War I, served as a first lieutenant in the Army Medical Corps; formerly on the faculty of Baylor University College of Medicine and Southwestern Medical School of the University of Texas; associate orthopedic surgeon, Dallas Medical and Surgical Clinic-Hospital; visiting surgeon, Baylor University Hospital; died Nov. 16, aged 61, of coronary occlusion.

Anderson, Hyrum Andrew, Rigby, Idaho; Harvard Medical School, Boston, 1896; member of the American Medical Association; before retirement served on the staff of the Idaho Falls Latter-Day Saints Hospital in Idaho Falls; died Dec. 29, aged 83, of chronic nephritis.

Anderson, James Vernie, Fort Worth, Texas; Loyola University School of Medicine, Chicago, 1916; affiliated with All Saints, Pennsylvania Avenue, and St. Joseph's hospitals; died Nov. 1, aged 61, of acute coronary occlusion.

Ball, John Dryer ✠ Santa Ana, Calif.; University of California Medical School, San Francisco, 1922; member of the International College of Surgeons and the Industrial Medical Association; fellow of the American College of Surgeons; past president of the Western Association of Industrial Physicians and Surgeons; chief-of-staff, surgery, Orange County General Hospital in Orange; visiting surgeon, St. Joseph Hospital in Orange; died Dec. 20, aged 55, of coronary thrombosis.

Bellinger, Frank Earl ✠ Council Bluffs, Iowa; John A. Creighton Medical College, Omaha, 1900; fellow of the American College of Surgeons; died Nov. 22, aged 77, of pneumonia and leukemia.

Casner, Andrew James ✠ Bloomington, Ill.; Chicago College of Medicine and Surgery, 1909; past president of the McLean County Medical Society; served during World War I; on the staffs of the Mennonite and St. Joseph's hospitals; died Dec. 19, aged 74, of acute coronary thrombosis.

Decot, Valentine Alphonsis, Buffalo; University of Buffalo School of Medicine, 1904; member of the American Medical Association; served during World War I; chief-of-staff of the Sisters of Charity Hospital and consultant, department of Ophthalmology, Mercy Hospital; a director of the Genesee National Bank; in 1926 received an honorary LL.D. degree from Niagara University; died in Deaconess Hospital Dec. 19, aged 72, of arteriosclerotic heart disease.

Eggers, Gustave C., Two Rivers, Wis.; St. Louis College of Physicians and Surgeons, 1890; formerly practiced in Clayton, Mo., where for many years he was health commissioner of St. Louis County; died in St. John's Hospital, St. Louis, Dec. 20, aged 86.

Hash, Edward William ✠ Chicago; Chicago Homeopathic Medical College, 1902; died in Oak Park Dec. 29, aged 82, of uremia, arteriosclerotic kidney disease, and diabetes mellitus.

Herrmann, Gustav J., St. Louis; Missouri Medical College, St. Louis, 1885; member of the American Medical Association; died in St. Louis Dec. 18, aged 89, of arteriosclerotic heart disease.

Hillman, Andrew Jackson, Ashland, Ky.; Hospital College of Medicine, Louisville, 1897; died in December, aged 81, of heart disease.

Karshner, Warner Melvin, Puyallup, Wash.; Northwestern University Medical School, Chicago, 1904; member of the American Medical Association; formerly state senator; fellow of the American College of Surgeons; at one time on the faculty of the University of Washington, Seattle; served on the staff of Puyallup General Hospital, where he died Dec. 19, aged 76, of hypertensive cardiovascular renal disease.

✠ Indicates Fellow of the American Medical Association.

Lackey, Walter Adair, Oklahoma City; Vanderbilt University School of Medicine, Nashville, Tenn., 1892; died Dec. 21, aged 80, of a heart attack.

MacDowell, George Alonzo, Chicago; Rush Medical College, Chicago, 1896; member of the American Medical Association; on the staff of Lutheran Deaconess Hospital; died Dec. 14, aged 79, of acute myocardial failure.

Mahre, John Alvin, St. Louis; University of Wisconsin Medical School, Madison, 1947; member of the American Medical Association and the Kansas Medical Society; assistant resident in internal medicine on the staff of St. Louis City Hospital, where he died Dec. 30, aged 28, of carcinoma.

Mitchell, Samuel Robert ✠ Milwaukee; Marquette University School of Medicine, Milwaukee, 1915; served during World War I; affiliated with St. Mary's Hospital, where he died Dec. 21, aged 65, of carcinoma.

Phelps, Robert May, Richmond, Ky.; Chicago Homeopathic Medical College, 1897; died Dec. 23, aged 76, of lobar pneumonia.

Sloane, Joseph T., New York; Medico-Chirurgical College of Philadelphia, 1895; veteran of the Spanish-American War and World War I; died December 12, aged 81.

Smith, Grover Augustus ✠ Montgomery, W. Va.; Medical College of Virginia, Richmond, 1915; for two terms was a member of the council of the state medical association; past president and secretary of the Fayette County Medical Society; served as a member of the staff of Coal Valley Hospital, now known as Laird Memorial Hospital; died Dec. 26, aged 66, of heart disease.

Stoll, Karl Ludwig ✠ Cincinnati; Ludwig-Maximilians-Universität Medizinische Fakultät, Munchen, Bavaria, Germany, 1900; member of the American Academy of Ophthalmology and Otolaryngology; on the staff of the General Hospital and Deaconess Hospital, where he died Dec. 17, aged 76, of heart disease.

Sullivan, John J. ✠ Reno, Nev.; Columbia University College of Physicians and Surgeons, New York, 1902; for many years chairman of the state board of health; formerly city health officer; at one time regent of the University of Nevada; on the staff of St. Mary's Hospital; died Dec. 14, aged 74, of carcinoma.

Troxell, George Allen, Sarasota, Fla.; Baltimore Medical College, 1900; for many years practiced in Medfield, Mass., where he was assistant superintendent until 1938 of the Medfield State Hospital; died December 14, aged 78, of arteriosclerosis and uremia.

Warfield, William Alonza, Washington, D. C.; Howard University College of Medicine, Washington, 1894; professor emeritus of abdominal surgery at his alma mater; for many years surgeon-in-chief of Freedmen's Hospital; died Dec. 18, aged 85, of cardiac failure.

Weber, Oliver Arkenburgh ✠ Cleveland; Western Reserve University Medical Department, Cleveland, 1905; fellow of the American College of Surgeons; served on the faculty of his alma mater; affiliated with St. Vincent Charity Hospital and the Evangelical Deaconess Hospital; died December 16, aged 71, of cerebral hemorrhage.

Welton, William Archibald ✠ Fairmont, W. Va.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1923; member of the Industrial Medical Association; fellow of the American College of Surgeons; served in France during World War I; affiliated with Fairmont General and Fairmont Emergency hospitals; died Dec. 19, aged 53, following an operation for brain tumor.

White, Harry J., Troy, N. Y.; Albany Medical College, 1899; member of the American Medical Association; served on the staff of Samaritan Hospital; died in the Albany (N. Y.) Hospital December 11, aged 73, of carcinomatosis.

GOVERNMENT SERVICES

ARMY

Tribute to Army Research Team.—A research team from the Army Medical Service Graduate School, Washington, D. C., whose work demonstrated the value of chloramphenicol (chloromycetin®) in the prevention and control of scrub typhus and other infections, was given international recognition this month on receipt of a letter from the British ambassador to the secretary of state. The letter reads, in part:

"His Majesty's Ambassador for the United Kingdom presents his compliments to the Secretary of State and has the honour . . . to convey the thanks and appreciation of His Majesty's Government in the United Kingdom and of the Government of the Federation of Malaya for the work of the United States Army Medical Research unit which has been, since 1948, attached to the Institute for Medical Research at Kuala Lumpur.

"The work of this unit, under the leadership of Dr. Joseph A. Smadel and Lt. Col. Robert Traub, on a group of recently discovered drugs with a wide range of action on typhus, typhoid and other infections, has gained international regard. . . ."

Certified Specialists on Duty.—Five hundred officers now on active duty with the Army Medical Service have been certified as professional specialists, the Surgeon General, has announced. This number includes 466 physicians qualified in 19 medical specialties and subspecialties, 23 board-certified dentists, 7 specialists in psychology, and 4 in nutrition.

The current situation contrasts with that in 1945 when only 75 medical board specialists were on duty with the Army. Of the 500 specialists, 311 are regularArmy Medical Corps officers, 148 are reserve or National Guard physicians on extended active duty and seven are retired regular Army officers remaining on active duty. When the Army began its residency training program five years ago, there were only 99 regular Army and 44 nonregular physicians with board certification on active duty.

In addition, 57 regular Army Medical Service Corps officers have received Ph.D. degrees and have had qualifying experience in fields such as entomology and sanitary engineering where specialty board certification is not possible. Many of the recently certified officers have obtained all their professional training and practice in the Army.

AIR FORCE

Commissions Available in Medical Services.—The Air Force has announced a program whereby commissions will be offered to young men and women practicing in all fields of medicine and in allied specialized vocations. The list of vocations includes doctors of preventive medicine, gastroenterologists, obstetricians, gynecologists, allergists, anesthesiologists, ophthalmologists, otorhinolaryngologists, neurologists, internists, general and orthopedic surgeons, radiologists, oral surgeons, periodontists, prosthodontists, medical supply and medical equipment maintenance specialists, sanitary engineers, clinical laboratory technicians, general duty and anesthetist nurses, dieticians, and physical therapists.

Each classification has a different set of requirements for each grade from second lieutenant through the higher grades. The First Air Force has set up clerical facilities for promptly answering all queries concerning these commissions. Inquiries should be directed to the Air Surgeon, Headquarters, First Air Force, Mitchel Air Force Base, New York.

Appoint Associate Editor.—The Surgeon General of the Air Force has nominated Col. Robert J. Benford as associate editor of the *U. S. Armed Forces Medical Journal.* Colonel Benford has specialized in the historical and bibliographical aspects of aviation medicine and is a member of the advisory editorial board for the *Journal of Aviation Medicine.* He is Air Force representative on the *Armed Forces Medical Journal* and on the consultants group for the Army Medical Library.

NAVY

Training Course in Amphibious Medicine.—The Bureau of Medicine and Surgery announces that a two week training course for Naval Reserve Medical and Dental officers in amphibious medicine will be conducted April 7-19, at the Naval Amphibious Base, Little Creek, Va. This course of instruction will familiarize inactive volunteer Naval Reserve Medical Department officers with amphibious operations and their medical aspects. It consists of lectures, training films, demonstrations, and practical exercises, and embarkation and debarkation phases of the medical service and the medical supply problems of an amphibious operation are dealt with.

Officers desiring this instruction should provide themselves with fatigue or utility type uniform equipment for participation in the practical aspects of the instructions. Meals and sleeping quarters will be available at the bachelor's officers quarters for officers who desire accommodations. Quotas for the course have been assigned to the commandants of the first, third, fourth, fifth, sixth, eighth, and ninth Naval Districts and the Potomac River Naval Command. Inactive volunteer reserve medical and dental officers residing in these districts who desire this course of instruction should request orders from the commandants of their Naval Districts. Active training duty orders in a pay status will be issued for this period of instruction.

The Legion of Merit Award.—Commander Thomas J. Canty, MC, in a recent ceremony at the Naval Hospital, Oakland, Calif., was presented the Legion of Merit for "exceptionally meritorious conduct in the performance of outstanding services to the Government of the United States as Chief of the Orthopedic Surgery; Officer-in-Charge of the Artificial Limb Department and Director of Prosthetic Research; Rehabilitation Officer at the United States Naval Hospital, Mare Island, California, from July 1945 to June 23, 1950." Commander Canty has remained as chief of the Navy's Amputee Center since it was moved to the Naval Hospital in Oakland in 1950 from the Mare Island Naval Hospital.

Reserve Consultants Board.—Dr. Benjamin Tenney Jr., professor of obstetrics and gynecology, Boston University School of Medicine, has accepted a position as reserve consultant to the Bureau of Medicine and Surgery to represent the specialty of obstetrics and gynecology. Dr. Tenney will fill the vacancy created in this group by the death last year of Dr. Paul Titus.

The Reserve Consultants Board of some 19 members meets in Washington, D. C., from time to time to advise the Bureau of Medicine and Surgery concerning matters pertaining to its graduate training program and to assist in the choice of reserve consultants to the staffs of naval hospitals and similar advisory duties.

Personal.—Dr. Howard T. Karsner, research advisor to the Surgeon General, was the guest speaker at the annual joint meeting of the Diplomates Association of Berks County Physicians and the Reading Eye, Ear, Nose, and Throat Society, Feb. 20, 1952, at Reading, Pa. The meeting was held jointly with the Southeastern Pennsylvania Chapter of the American College of Surgeons. Dr. Karsner's subject was "Modern Directions of Medical Investigation."——Capt. Frederick Ceres, MC, after more than 38 years continuous Naval service, was placed on the retired list on February 1. Captain Ceres in 1939 organized and founded the Naval School of Aviation Medicine, Pensacola, Fla.——Capt. John Ryer Poppen, MC, retired after nearly 36 years of active Navy duty January 1. Prior to retirement he had served as director of the Navy's newest aviation medical acceleration laboratory at Johnsville, Bucks County, Pa. ——Rear Adm. Lamont Pugh, Surgeon General, was honored December 1, 1951, in ceremonies at Wagner College, Staten Island, N. Y., when the college bestowed on him an honorary degree of Doctor of Laws.

FOREIGN LETTERS

BRAZIL

Chagas' Disease.—Chagas' disease, or schizotrypanosis, is now well known in many aspects. Searches have been carried out, based on findings of complement fixation tests and xenodiagnoses, to determine the extent of Chagas' disease in Central Brazil.

Pedreira de Freitas, working in rural regions of São Paulo and Minas, obtained 511 positive tests from 996 serums, that is, 51.3%. Using the same tests in soldiers of the second military region, Faria and his co-workers found 41 positive reactions from 141 serums (29.07%). Miron de Menezes found a positive reaction in 32 cases out of 59 at his cardiology clinic in Uberlandia (54.2%). In the capital of Minas, Pellegrino and Borrotchin found 37 positive reactions among 181 nonselected patients in Santa Casa Hospital (20.4%). In Uberaba, Rubem Jacomo got, from 226 tests, 119 positive results (52.6%). From a total of 2,893 tests performed in Minas, São Paulo, and Goiaz, 52.5% show a positive result, revealing the high incidence of schizotrypanosis in these regions of Central Brazil.

The significance of Chagas' infection should be considered as an important factor of the poor health of the rural population, one that reduces their productive capacity. Since the basic work of Chagas, Gaspar Vianna, and Margarinos Torres, the affinity of Schizotrypanosis cruzi for the heart has been well known. The contracting fibers are invaded by multiplying forms of Leishmania, which cause acute myocarditis, at times of such intensity, according to Torres, as is not equalled by any other disease process in human pathology. The well-known classical works of Chagas, Vilela, and Evandro Chagas, describe the clinical manifestations of Chagas' cardiopathy, the multiple alterations of rhythm, which reveal the myocardial lesions due to the parasitic invasion.

Thus, in 208 cases of chronic Chagas' cardiopathy studied in Bambui, it was found that 155, or 74.3%, showed alterations in conduction, among which right bundle branch block (43.3%) and auriculoventricular block (30.3%) predominate. As for disturbances in stimulus formation, ventricular extrasystoles stand out, occurring in at least 52.9% of the cases. The most serious finding is, however, that the electrocardiographic alterations indicative of myocardial lesion were found in about 50% of the cases of chronic schizotrypanosis in that region. The idea is thus confirmed that, at least in Brazil, Chagas' disease is essentially a cardiotropic infection, as pointed out by Dr. Emmanuel Dias, of Instituto Oswaldo Cruz.

Ethnic Aspects of Portal Vein.—Anatomic observations on the confluence of the "roots" of the portal vein in whites, Negroes, and mulattoes were performed by Dr. Liberato Di Dio at the anatomy department of the Faculdade de Medicina of São Paulo. He studied the confluence of the roots of the portal vein in 191 cadavers (94 whites, 62 men and 32 women; 59 Negroes, 37 men and 22 women; and 38 mulattoes, 27 men and 11 women). Dr. Di Dio's conclusions are as follows.

1. The most frequent disposition, 92.1%, is the "biradicular portal vein," in which the inferior mesenteric vein ends either in the splenic (A biradicular type [47.1%]) or in the superior mesenteric vein (B biradicular type [45%]) without ethnic difference.

2. Of the cadavers, 7.9% have the confluence of the three veins: superior and inferior mesenteric and splenic constituting the trunk of the portal vein (triradicular type).

3. Among the whites, the incidence of cases in which the inferior mesenteric vein ended in the splenic vein was 58.1% greater in the men than in the women (28.1%). The incidence of cases in which the inferior mesenteric vein ended in the superior vein was 62.5% greater in women than in the males (35.5%). In the Negroes and mulattoes there was no sex difference in the incidence of these conditions.

The items in these letters are contributed by regular correspondents in the various foreign countries.

LONDON

National Health Service Charges.—Details of the charges that the government proposes to impose in the National Health Service, as part of the plan to deal with the present economic emergency, have now been announced. The total effect will be to save £20 million a year on the service. A charge of 1*s.* will be made on each prescription form issued, although the form may contain more than one prescription. This will apply to prescriptions issued by physicians and dentists and prescriptions issued to hospital outpatients. Patients receiving national assistance, or their dependents, will be able to reclaim this sum. It is estimated that these charges will bring in £12 million a year from general prescriptions and £500,000 from hospital prescriptions. A fixed flat rate charge representing about half the cost will be made for certain appliances supplied to hospital outpatients; these will include surgical belts and boots, hearing aids, wigs, and the full cost of repairing of these appliances. No charge will be made for these appliances when they are supplied to hospital inpatients or to outpatients who are under 16 years of age or in full-time attendance at school, recipients of national assistance or their dependents, or war pensioners, if the appliance is supplied because of an accepted pensionable disability. This charge, it is estimated will save £500,000 a year. Charges ranging from 5*s.* to 10*s.* will be made for elastic hosiery prescribed by general practitioners. The charge for "amenity" beds in hospitals will be doubled, and a charge of £1 (or the full cost, if less) will be made for all dental treatment except dentures, for which the patient is already charged. This will not apply to children under the age of 16, persons who are in full-time attendance at school, expectant or nursing mothers, or dental patients who are treated in a hospital. The charges will bring in £7,500,000 a year.

The passage of these new regulations through Parliament is expected to result in heated controversy. As for the medical profession, the consensus of opinion is that the service must share in the cuts imposed by the present financial stringency; one of the major effects of the charges will be on reducing the number of unnecessary calls made by patients on their physicians.

Spiritual Healing.—There has been a renewal of interest in spiritual healing in England since the end of World War II, and, during its recent session, the Lower House of Convocation, of the Church of England, approved a motion "That this House commends to the sympathetic attention of the Church and particularly of parish priests the modern revival of spiritual healing" and asked the Archbishop of Canterbury to appoint a committee "to examine the problems and opportunities raised by the modern revival of spiritual healing and report." In introducing the motion, the Dean of Salisbury took the view that one of the principal causes of the present drift from religion was the number of unorthodox sects, which, on a false theological basis, claimed to make up for what they thought was lacking in the Church in its attitude toward healing. He claimed that a revival of spiritual healing would do much to set the balance right. During the subsequent debate, it was emphasized that spiritual healing was not in competition with medical science, and that, in recent years, orthodox workers had come to recognize the value of spiritual factors. Appeals were made for increasing cooperation between physicians and priests.

This debate has drawn attention to the work of the Guild of Health that has over 50 years of research and experience behind it; through its long tradition of collaboration with the medical profession, the guild has avoided many of the pitfalls into which spiritual healers so often fall. The guild has just established a center, the main purpose of which is "to enable clergy, doctors, psychologists, and members of the nursing profession to work together in furthering the cause of health and healing." The work of the center is threefold, therapy, reeducation, and research. It is interdenominational and has the support of the leading representatives of the Church of England and the free churches.

V 1
195

Annual Toll of Burns and Scalds.—In an article in *The Times*, Dr. Leonard Colebrook, former director of the Medical Research Council, Burns Unit, discusses a subject that he has studied intensively during recent years, the toll of life and disability caused by burns and scalds. The death rate from these accidents in England is 14 per 1,000,000, compared with 55 per 1,000,000 in the United States (in 1948), and 10 per 1,000,000 in Sweden (in 1947). The incidence of nonfatal accidents is much higher, and it is calculated that 15,000 to 20,000 burn and scald patients are admitted to hospitals every year in England and Wales and that 50,000 more are treated as outpatients. The average stay in the hospital is 40 to 50 days, and these patients occupy hospital beds for at least 857,000 days. An intensive six-year study, recently completed in Birmingham (population, 1,000,000), showed that production time lost by such injuries to adults between the ages of 15 and 64 years was 14,000 days a year, and that, among children aged 5 to 14 years, the schooling loss amounted to 6,000 days a year. Of the 2,000 consecutive accidents studied, two-thirds occurred in the home, and one-half of these cases were scalds, and 80% of the victims were children. The other half, which included practically all the fatalities and crippling injuries, were burns that were caused by unguarded fires and the high inflammability of the clothing material worn by women and girls. The open coal fire, "the outstanding hazard of the English home," was responsible for 235 of the 724 home burns, which included 35 deaths. Gas and electric fires were responsible for 144 cases (80% were old persons and children), which included 20 deaths. Prevention consists of a more intensive search for noninflammable fabrics that are both aesthetically pleasing and reasonably priced and the guarding of fires. In the case of coal fires, new types of fireguards are being experimented with, and it is hoped that when these are available, local authorities will loan them or sell them at cost price to persons with homes in which there are old persons or children. The sale of gas and electric fire apparatus should be forbidden unless they are adequately guarded. As a long-term solution "the development of central and district heating and the better insulation of houses (making fires less often necessary)" are recommended.

Beds in Hospital.—In a featured article in the *Times* is discussed a problem that is giving rise to much anxiety at the moment—"the inability of the new hospital service to afford the reasonable measure of privacy wanted or needed by some patients." As the result of a recent investigation, the Nuffield Trust concludes that a quarter of all beds in medical and surgical wards should be placed in single rooms, in order to accommodate those patients for whom such privacy is necessary on medical grounds, e. g., those who are dying, infectious, and distressed by, or distressing to, other patients. The *Times* correspondent suggests that this allocation "would commonly leave some margin for patients with a personal preference, as distinct from a medical need, for separation." In order to find out whether this allocation would be effected without any increase in cost or staff, experimental wards are being built. Even if this experiment is successful, it will be many years before the plan can be generally accepted, as the hospitals of this country were designed and built to house patients in large open wards. Under the National Health Service, beds in single rooms or small wards, if not required for patients needing isolation on medical grounds, can be used by patients seeking privacy for personal reasons at a weekly fee of 42 shillings for a single room and 21 shillings for a bed in a shared room. In England and Wales these "amenity beds" have seldom been used for this purpose, and the bulk of those that have been used for this purpose have been in mental hospitals. In Scotland they have been used to a much greater extent for patients desiring privacy on personal grounds. For instance, while Scotland has a quarter of all the nation's "amenity beds," it earns nearly half of all the fees paid, averaging £63 a year for each bed as against £8 in the English teaching hospitals and £24 in English nonteaching hospitals. As the *Times* points out, "if the existence of amenity beds were not so generally concealed from patients south of the border, the Scottish example suggests that the health service could double the small income from fees for amenity beds without raising the charge or increasing the number of such beds."

An alternative method whereby patients can obtain privacy is to use one of the 7,600 private pay-beds, "which are still reserved largely for patients outside the health service who personally pay both physicians and hospitals for services given." Over a quarter of these beds are in teaching hospitals. These pay-beds in hospitals were originally provided in order to help private patients who were unable to pay the fees of private nursing homes. Gradually, however, the charges for them tended to be raised, as the hospitals found them a useful source of income, and in many cases they reached a level that the ordinary private middle-class patient could not afford. This process was accentuated with the advent of the National Health Service, which abolished the subsidized private pay-bed and insisted that the charges for such private beds in hospitals should meet their full cost. These costs have now reached such a level that relatively few patients can afford them, and the demand for such beds is falling. To some this would appear not unreasonable, and they would contend that these private pay-beds could be put to a much better use, e. g., to cut down the waiting list of tuberculous patients. The *Times* contends that "public opinion would not tolerate the complete exclusion from the public hospitals of patients who, while deliberately preferring to choose and personally pay their own physicians or surgeons, require treatment of a kind not possible in even the best-equipped private institution."

The *Times*' article rejects the British Medical Association's solution of the problem, that amenity beds should be converted into pay-beds and that the charge for these should be subsidized by the service. As an alternative, it suggests that half the present unsubsidized beds be kept for patients who can afford to pay the full charge, that the other half be converted into amenity beds, and that the charge for all amenity beds be raised to from £3 to £6. This would increase the hospitals' income, would insure that the beds were all occupied, and would provide some measure of relief to that most harrassed section of the whole community at the present—the middle or professional class.

The Law and the Illegitimate Child.—A joint committee of the British Medical Association and the Magistrates' Association has issued a report entitled "The Law in Relation to the Illegitimate Child." This has received the unanimous approval of the Council of the British Medical Association, but the Council of the Magistrates' Association, although agreeing to publication, does not accept all the views expressed. The committee decided that "the law concerning the maintenance, custody, and welfare of illegitimate children is in urgent need of revision" and recommends that a committee of inquiry be set up by the government to investigate the problem. The following recommendations are among the more important conclusions reached by the committee.

It asks for investigation of the present rule that a child cannot become legitimate on the subsequent marriage of the parents, if one of the parents was married to a third person when the child was born. At present, the maximum payment that can be ordered by a Magistrates' court for the maintenance of an illegitimate child is £1 a week, whereas in the case of a child born in wedlock, it is 30*s*. It is recommended that the payment for an illegitimate child be equal to that for a legitimate child. The present law, whereby procedures to enforce payment on a bastardy order cannot be taken after the death of the father, should be amended. It is considered that marriage of the parents should not automatically be regarded as the solution to the problem of the illegitimate child. If there be no evidence to the contrary, an illegitimate child should remain with the mother, but, in exceptional cases, a court should be able to grant custody to the father. "As far as possible, every illegitimate child should be brought up in a home and a family" and should only be sent to an institution after all else fails. The committee considers that it is "usually wiser" to disclose the fact of its illegitimacy to a child "because it almost inevitably finds out sooner or later, with the consequent risk of grave psychological damage." It is recommended that the child's legitimacy be explained "at an age when the child can understand the implications, say, between eight and 11 years of age, or earlier in response to questions from the child." The child should not be told of its illegitimacy during

adolescence "unless the case has first been referred for expert advice." A new name for the illegitimate child is desirable. The terms "illegitimate child" and "bastard" are undesirable, and, although a satisfactory substitute could not be agreed on, it was felt that of the suggested names, "natural child" was the least objectionable.

NORWAY

Old Age Research.—When the influential Norwegian National Association Against Tuberculosis recently changed its title to the National Association Against Tuberculosis and for Health, it wished to stress the interest it intended to take in other fields in addition to tuberculosis. One of its most recent activities is concerned with old age. It has appointed a committee with the title of the Health Committee of the Old. Its chairman is Dr. Per Hanssen, head of the medical department of a public hospital in Stavanger. In an address on geriatric problems, delivered at a postgraduate course for doctors, he emphasized the importance and size of the problem of old age by quoting figures published by the Norwegian Statistical Central Bureau, concerning the increase in the expectation of life in Norway. According to this source of information, which dealt with the two periods 1931-1940 and 1945-1948, there was such a remarkable increase between these two periods in the expectation of life that the man who was 80 in the former period could hope to live another 5.8 years, whereas in the latter period his expectation of life would be raised to 6.4 years. This remarkable achievement in a short time may be a tribute to the more effective control of certain infectious diseases by the sulphonamides and the antibiotics, but it is also a reminder that the ranks of the aged are being recruited at a rapidly increasing rate. By the same token the responsibilities of youth are being enormously increased.

Dr. Hanssen pointed out that the association includes in its program stimulation of scientific research into health problems of the aged. The committee is to devise a plan of research with reference to the different needs of the aged, according to whether they live in town, in the country, or in different parts of Norway where the conditions of life are not uniform. The committee is also to inquire into the mental attitude of the aged towards their environment, into the diseases to which they are peculiarly liable, and into the diet most suitable for them. They are to be asked whether they are satisfied with retirement or would prefer daily occupation and duties. With the cooperation of the medical profession, it is hoped that much useful information will soon be collected on this subject.

Tuberculosis Depending on Intensity of Infection.—For nearly three decades Dr. J. Heimbeck has carried out tuberculin and BCG vaccine studies of nurses at the Ullevaal Hospital and of other groups of persons. He has come to the conclusion that in many cases the development of tuberculosis depends on the intensity with which infection occurs. In support of this opinion he has published in the organ of the Norwegian Medical Association, *Tidsskrift for den norske laegeforening*, for Jan. 1, a statistical investigation covering a wide field over a long period. One of his statistical tables deals with 253 Ullevaal nurses who, between 1924 and 1936, were exposed to intensive infection in the course of nursing. They were originally Pirquet negative, and they were not vaccinated with BCG. In this group there was a tuberculosis morbidity of 43% and a tuberculosis mortality of 5.5%. Serving as a control group were 948 young women of the same age, living in Oslo, who were originally Pirquet negative. They were no more exposed to infection with tuberculosis than other members of the community. In the course of more than 5,000 observation years, 250 of these women became infected with tuberculosis, 51 of them developing definite tuberculosis and 5 of them dying of it. There was a tuberculosis morbidity of 20% and a tuberculosis mortality of 2%. In other words, the tuberculosis morbidity and mortality were twice as high among the nurses as in the controlled group.

Another comparison concerned 668 Pirquet-positive probationer nurses who, in the course of three years of nursing and exposed to intensive infection, showed a tuberculosis morbidity of 11.3 and a tuberculosis mortality of 0.5 per 1,000 observation years. Serving as controlled persons were 620 nurses kept under observation after their completion of training as nurses. Nearly all of them had ceased to be exposed to intensive infection with the result, according to Dr. Heimbeck, that they showed a tuberculosis morbidity of only 2.2 per 1,000 observation years, i. e., a tuberculosis morbidity of only one-fifth of that of the nurses in attendance on infectious cases. In another statistical comparison, Dr. Heimbeck believes that after vaccination with BCG the prospect of developing tuberculosis depends largely on whether the persons concerned are or are not exposed to intensive infection. He argues that intensity of infection is of great importance not only to a primary infection but also to superinfections and that for this reason tuberculosis patients may suffer from contacts with their fellow patients.

A New Institute for Experimental Medical Research.—Last December the new institute for experimental medical research at the Ullevaal Hospital (Oslo City Hospital) was formally opened. It is the first institute of its kind in Norway, and it is the outcome of much generous enterprise. Earlier last year whale oil interests made a gift of one million kroner to the University of Oslo, with a view to the establishment of a research institute. Later in the year another contribution of 350,000 kroner was made by Anders Jahre, one of the leaders of the whale oil industry. Another sum of 200,000 kroner, to be spent at the rate of 40,000 kroner a year for five years, has also been contributed. These sums are administered by a university committee, whose chairman is Prof. Carl Semb. At the institute's headquarters, Dr. A. Kolberg is already engaged on research into the physiology of the kidneys. Working as technical assistant is Mary Frances Morrill of the Massachusetts General Hospital. The institute is advertising a vacancy for a young doctor with an inclination for research into the peripheral circulatory system. A minimum salary of 12,000 kroner a year will be available for three years. The holder of this appointment will be given financial support for preliminary studies at home and abroad before he takes up his new duties.

PARIS

Bronchiectasic Aspergilloma.—On Oct. 16, 1951, O. Monod, G. Pesle, and G. Ségrétain discussed, before the National Academy of Medicine, a new form of pulmonary aspergilloma, caused by Aspergillus fumigatus, which they propose to name bronchiectasic aspergilloma. Three cases were diagnosed by the authors, two by Professor Orie, and four were found in the medical literature under various appellations. This new pathological entity is characterized by a spherical mycelian tumor (consisting of the entanglement of ramified filaments) enclosed in a bronchial cavity. It is located in the floor of a smooth, regular cavity; there are two bronchial apertures, thus presenting a sacciform ectasia. The reaction of the neighboring bronchial tissue suggests a basic action of the fungus, which, nevertheless, does not penetrate deeply into the pulmonary tissues. Contrarily to parasitosis or bronchopulmonary tumors, the lesion is not inflammatory; the authors are inclined to think that this fungus forms an antibiotic. Another phenomenon, unusual in pulmonary pathology, is the absence of bronchial obstruction, atelectasis, and suppuration. The diagnosis depends on the strikingly characteristic radiographic picture, which, in all nine patients, was able to be superimposed. It presented a uniform, slightly dense opacity, was rounded, or in the form of an almond, and surmounted with a clear, thin crescent surrounding its superior three quarters; in two patients, followed for five and six years, roentgen appearances remained unchanged. The culture from sputum and from the product of the exploratory puncture confirmed the diagnosis. Clinically, bronchiectasic aspergilloma is manifested by hemoptysis of red blood for months and years.

Treatment.—The only effective treatment of this chronic disease is segmental exeresis, which removes the lesion and preserves the rest of the lung; iodine, antibiotics, or radiotherapy were ineffective.

V 14
1952

CORRESPONDENCE

FOREIGN BODY IN THE EYE

To the Editor:—An article entitled "Simple Removal of Ocular Foreign Bodies," on page 119 of the Jan. 12, 1952, issue of THE JOURNAL states that a BB shot was in the center of the vitreous and "that with pressure applied over the most posterior aspects of the visible sclera the BB popped out of the eyeball with a yellow gelatinous material that took the form of a long tail." Any competent ophthalmologist will quickly recognize this as conjunctival secretion. The foreign body never was inside of the globe but only in the conjunctival sac, and when the lids were opened the shot fell out. The report is clinically misleading and may be also dangerous, for it recommends a method of treatment fraught with grave risks.

The reporter failed to find any opening in the globe before or even after his manual expression. This is sufficient to cast a deep shadow of doubt regarding the primary observation and discredits the secondary deductions and recommendations, for, if the shot had been inside of the eye, there would have been a visible hole in the globe after its extrusion.

All physicians should avoid pressure on the eyeball as a means of removing an intraocular foreign body. Each case is a law unto itself and should have the best possible expert care. Disregard of this admonition will lead to serious disaster and a disheartening outcome.

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148
52

HYPOCOAGULABILITY OF IRRADIATED PLASMAS

To the Editor:—Our paper on "Hypocoagulability of Certain Irradiated Plasmas," in THE JOURNAL, July 22, 1950, page 1057, has provoked a "reinvestigation" of our work by Kaplan and Friedman ("Effects of Ultraviolet-Ray Irradiation on Clotting Mechanism of Plasma," *J. A. M. A.* **147:**229 [Sept. 15] 1951), in which they conclude that our ideas are erroneous and our conclusions untenable. We wish now to compare our original statements and the data of Kaplan and Friedman, which supposedly refute our findings.

We examined the coagulability of various lots of human plasmas, irradiated, unirradiated, fresh, lyophilized, and plasma stored in liquid form. Irradiated liquid plasma, prepared and distributed by the Michael Reese Research Foundation, could not be coagulated by thrombin, even when applied in great concentrations. We stated that this phenomenon is due to the effect of ultraviolet irradiation. Kaplan and Friedman challenge this statement and set up two experiments to determine the effect, if any, of ultraviolet irradiation on fresh and on three-month-old liquid plasma, with results as shown in their tables 1 and 2 respectively. In table 1, we find but a single comparison. Here they compare the clotting time (after addition of thrombin) of a single four-day-old plasma sample before and after irradiation. Under the heading Conclusions, they state, "The ultraviolet-ray irradiation of fresh plasma does not alter its clotting mechanism." Under Comment they state, ". . . the clotting of fresh irradiated plasma is practically the same as that of an aliquot unirradiated sample." Under the heading Results, they state, "The results show the clotting mechanism of the irradiated plasma to be identical with the aliquot unirradiated sample and the control sample." These statements are specific but are not in accord with the facts given in their first table. The clotting time after irradiation rose from 29 to 35 seconds, an increase of 20.7%! The second table is equally interesting; here the clotting time of eight pools of three-month-old liquid plasma are again compared before and after irradiation. At this point Kaplan and Friedman admit that, in this experiment, "the procedure of ultraviolet-ray irradiation does alter the clotting mechanism," but they attempt to minimize the effect of this admission by stating, "This alteration is of the magnitude of fractions of a minute." What are the facts given in their second table? After irradiation, the clotting time (after addition of 1 unit of thrombin) rose sharply in every instance. The average increase was 44.2%, and the greatest increase was 71.0%! If, in their second table, we further compare the postirradiation clotting times as measured by 40 units of thrombin plus 1 mg. of heparin, the changes are even more spectacular: an average rise of 119%, and a maximum rise of 200%! We thus see the confirmation of our claim that ultraviolet irradiation alters the coagulability of plasma.

The second part of our paper described our demonstration that this failure of irradiated liquid plasma to clot could be substantially reversed by addition of protamine sulfate or of toluidine blue. We gave data indicating that an inverse ratio exists between the amounts of thrombin, on the one hand, and of protamine or toluidine, on the other hand, needed to clot the seemingly incoagulable Michael Reese plasma. As a control mixture of protamine, thrombin, and serum or defibrinated plasma does not clot, we thus demonstrate, conclusively, the presence in the irradiated and aged liquid plasma of fibrinogen in amounts adequate for clot formation. Kaplan and Friedman do not comment on this vital point, and nowhere in their paper is there mention of any attempt to confirm or deny this finding. This is indeed a serious omission in a study whose entire purpose is a "reinvestigation" of our work.

What explanation for our findings do Kaplan and Friedman offer? We quote from their conclusions: "The inability of aged liquid plasma to clot upon the addition of thrombin is due to the disappearance of fibrinogen . . . ." As we had already proved the presence of fibrinogen, it is interesting to seek the evidence Kaplan and Friedman use to deduce its absence. They do not present one direct analysis for fibrinogen in even a single sample of plasma; however, by citing the careful studies of Taylor and associates (*J. Clin. Invest.* **23:**351 [May] 1944) Kaplan and Friedman leave the erroneous impression that these workers are responsible for the following statement: "By the end of six months, the prothrombin level is down to 2%, and the fibrinogen has completely disappeared." Actually, Taylor and his co-workers were fully aware of the deterioration of the coagulation mechanism, and, after carefully describing their methods for determining fibrinogen, state, in reference to liquid plasma stored over a period of six months, "Fibrinogen, when it was possible to determine it, was present in normal amounts. As is shown in the protocol, fibrinogen could not be determined in the older liquid plasmas due to failure of the coagulation mechanism. The clotting properties, when thrombin was used were likewise impaired in some instances." Kaplan and Friedman then show, in their third table, that unirradiated aged plasma fails to clot. This is, of course, well known, having been demonstrated by Taylor in 1944, and, in any event, is no confirmation of the alleged absence of fibrinogen. Finally, in an effort to prove the absence of fibrinogen in the aged plasmas, Kaplan and Friedman add fresh fibrinogen to a variety of mixtures containing thrombin and produce clots. From this they conclude that they have replaced the missing fibrinogen but fail to recognize that the addition of sufficient fibrinogen and thrombin to any fluid produces fibrin clots. Thus this experiment proves nothing about the fibrinogen content of the original fluid.

The remainder of Kaplan and Friedman's paper attempts to explain our third finding, that of the anticoagulant properties of irradiated (or aged) plasmas. We quote from our paper: "It was then found that this failure to clot held, in lesser degree, *with* mixtures of M. R. [Michael Reese] plasma and our control B. B. [Blood Bank] plasma: 0.5 cc. B. B. plasma plus 0.5 cc.

sodium chloride solution plus 0.5 units thrombin clotted; 0.5 cc. B. B. plasma plus 0.5 cc. M. R. plasma plus 0.5 units thrombin did not clot. This latter mixture required 4 units of thrombin to clot, representing an eight to tenfold increase over the amount of thrombin required to clot the control plasma." Apparently, in attempting to test this finding, Kaplan and Friedman kept their thrombin constant, adding fibrinogen, and found that an unexpectedly large amount of fibrinogen was needed for clot formation. One thus sees that the irradiated or aged plasmas contain an anticoagulant that prevents the action of thrombin on fibrinogen, until a large excess of fresh fibrinogen is added. Although our explanation is rejected, Kaplan and Friedman offer no alternative theory, merely stating that "changes other than those already noted occur in aging plasma." At this point in the discussion of our paper, results given in our table 3 are erroneously interpolated, quite out of context, instead of results from a similar table illustrating in greater detail our findings quoted immediately above. As things stand, Kaplan and Friedman are quite correct in attributing the results seen in our table 3 to excess oxalate effect; however, oxalate obviously plays no part in any of the mechanisms discussed thus far, as the action of thrombin on fibrinogen occurs at a later stage in the clotting mechanism than the stage at which calcium ions are needed. This is self-evident. The final table in Kaplan and Friedman's paper demonstrates that five recipients were unharmed by the infusion of 600 cc. of irradiated liquid plasma. No details are given, but if the subjects are adults, they would probably have sufficient circulating and stored fibrinogen to escape hemorrhagic complications. It would be prudent to perform similar experiments cautiously.

We therefore find that, although Kaplan and Friedman differ with us, their own data clearly support our conclusions.

A recent study by Lyttleton and Vallet, "Coagulability of Irradiated Plasma," (*Lancet* **1:**1102 [May 19] 1951) confirms our finding that ultraviolet irradiation of plasma markedly prolongs the clotting time. In a careful series of experiments, Lyttleton and Vallet exclude the effect of mechanical agitation or of ozone, and demonstrate that purified fibrinogen itself undergoes changes after irradiation that are clearly responsible for the changes in irradiated plasma. Shinowara (*Federation Proc.* **10:**246 [March] 1951) tested dried human plasma stored four to six years and found adequate amounts of fibrinogen, prothrombin, and thromboplastic plasma component (TPC). After ultraviolet irradiation, a marked decrease of TPC was noted. Shinowara therefore warns, "Currently available plasma treated with ultraviolet radiation to destroy possible viral and bacterial contaminants would be of questionable value for a hemophiliac or any individual whose hemorrhage is due to TPC deficiency."

Finally, we wish to comment, briefly, on the electrophoretic patterns of irradiated plasma. The Michael Reese group states (in package literature distributed with their plasma) that, following ultraviolet irradiation, "Electrophoretic studies showed no change in pattern or mobility of the proteins," and again, apparently referring to the same source (Wolf, and others: *J. A. M. A.* **135:**476 [Oct. 25] 1947): "There were no consistent variations between irradiated and nonirradiated samples." This lack of change, if true, would be most surprising, in the face of the well-known ability of ultraviolet energy to denature proteins. Compare, for example, Davis, Hollaender, and Greenstein (*J. Biol. Chem.* **146:**663 [Dec.] 1942) where, following heavy ultraviolet irradiation, denaturation of plasma proteins was clearly shown by changes in the electrophoretic pattern, colloid osmotic pressure, and viscosity. To clarify these conflicting statements, we submitted different samples of unirradiated pooled liquid plasma and Michael Reese plasma (irradiated and aged liquid plasma) to an outstanding expert in electrophoresis, Dr. Kurt G. Stern. We quote, with permission, from his detailed report: "The Michael Reese material exhibits a highly anomalous electrophoretic pattern. The changes here found far exceed any changes we have observed on storage, and the plasma here must be considered a modified or derivative protein spectrum, rather than one representative of native human plasma. From the diagrams obtained, the presence of *unmodified* fibrinogen and *unmodified* gamma globulin can be excluded, which in itself would explain the abnormal clotting properties of the plasma." Thus, our finding that ultraviolet irradiation of plasma causes alteration of the clotting mechanism is further substantiated.

The following conclusions seem warranted:

1. Ultraviolet irradiation of fresh or moderately aged liquid plasma markedly impairs its coagulability. As stale liquid plasma has already deteriorated to the point of incoagulability, it is at present not known what further effects ultraviolet irradiation may have. (We are now attacking this problem by studies of the length of the fibrinogen molecule.)

2. Anticoagulant effects of these plasmas when mixed with normal blood or plasma are clearly demonstrable. Inasmuch as this effect is revealed with the use of preformed thrombin, the first and second stages of coagulation are not involved, and the action of thromboplastin, ac-globulin, calcium ions, or oxalate need not be considered.

3. Irradiated plasma stored in the liquid state bears little resemblance to unprocessed human plasma, and is of value principally for its osmotic properties, as are polyvinyl pyrrolidine, dextrans, and similar substitutes. This plasma should not be given to persons exposed to ionizing radiation from atomic bomb or other sources. It should be used in hemorrhagic shock and in bleeding diatheses only when whole blood, fresh plasma, or lyophilized plasma is not available. Because of the "derivative," (denatured?) protein present, one would use this material with more confidence if appropriate investigations of the long-term effects of this protein upon the liver, the kidney, and the reticuloendothelial system demonstrated its harmlessness.

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V 148
1952

BLOOD COAGULATION

To the Editor:—The recent article "Influence of Some Drugs and of Emotions on Blood Coagulations," by Dr. D. I. Macht, in THE JOURNAL (**148:**265 [Jan. 26] 1952) ascribes to several common drugs an important influence in increasing blood coagulability and associates this effect with thrombotic and embolic episodes in patients receiving these drugs. Some negative views were cited but a more reliable conclusion would be reached if still others, such as the following, were examined. Sutton, Levin and Ruskin, Sokoloff and Ferrer, Moses, Poindexter and Meyers, and Fowler have examined the possible effect of digitaloids on the blood clotting mechanism in patients. Each of these studies demonstrated that the usual variations in such factors as clotting time and prothrombin time are not significantly changed after digitalization. Similarly, Fahey found that corticotropin and cortisone had no significant effect on coagulability of whole blood in patients with and without adrenal syndromes. Shapse and Wright and Lasser, Versakos, and Loewe reported that aureomycin had no effect on blood clotting in patients. Poindexter and Meyers reported that morphine, mercurophyllin injection (mercupurin®), and several other common drugs had no apparent effect on prothrombin clotting time in patients. Moses found that epinephrine produced no significant effects on heparin tolerance curves in patients, and Wakim, Fink, and Chen found epinephrine did not significantly influence prothrombin clotting time of animals. None of these reports were cited in the article mentioned above. Hines and Kessler were quoted as finding thromboplastic effects following administration of penicillin. Actually, they reported penicillin either had no effect on prothrombin time or appeared to potentiate the anticoagulant effects of heparin in a few patients. Other uncited negative reports of this type have appeared, some of which have been quoted recently by Marple and Wright.

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COUNCIL ON MEDICAL SERVICE

PROGRESS REPORT ON GRIEVANCE COMMITTEES

A little more than two years ago, in December, 1949, the House of Delegates of the American Medical Association adopted a resolution urging that all constituent medical associations have committees to hear complaints from the public. All state medical associations have for a long time had some provision for disciplining members who violate the Principles of Medical Ethics. The resolution of the House of Delegates, however, urged the creation of a special committee or some special mechanism within an existing committee that would devote particular attention to public grievances against individual physicians or against the medical profession generally. Such a committee not only would be concerned with disciplining members but would also be concerned with improving relations between the medical society and the public. During the two years that have intervened since December, 1949, most of the constituent associations have accepted this challenge. The Council on Medical Service has just completed a pamphlet on the progress that has been made in this field, and following is a brief résumé of the detailed material contained in "Medical Society Grievance Committees—A Progress Report."

At present 42 constituent associations, including the District of Columbia and Hawaii, either have created special committees or have specifically delegated this function to existing committees. Only eight associations have no program for handling grievances on a statewide basis. Of these, one has prepared a prospectus for such a committee, which is to be voted on in 1952, and three are studying the problem. Of the remaining four states, two have left the function in the hands of local societies; one has decided to postpone formation of such a committee, and one has not submitted definite information.

The following associations have committees that have as their primary function the hearing of public grievances:

Arizona	Kentucky	Rhode Island
Arkansas	Maryland	South Dakota
California	Massachusetts	Tennessee
Colorado	Michigan	Texas
Connecticut	Montana	Utah
Delaware	Nebraska	Vermont
District of Columbia	New Hampshire	Virginia
Florida	New Jersey	Washington
Idaho	New Mexico	West Virginia
Illinois	North Carolina	Wisconsin
Indiana	Ohio	Wyoming
Iowa	Oklahoma	Territory of Hawaii

The states in which this function is handled by the council of the state medical association are Georgia, Kansas, Louisiana, Minnesota, Missouri, and Nevada; the states where committees are under consideration are New York, North Dakota, Oregon, and South Carolina; and the states without committees are Alabama, Maine, Mississippi, and Pennsylvania.

COMMITTEE TITLE

Although there is considerable controversy concerning the propriety of the term "grievance committee," it remains the most popular title and is used by 19 constituent associations. Of the 15 different titles currently used, the term "mediation committee," (as used in Michigan and Montana) seems to describe most adequately the function of such a committee and at the same time is short enough to be practical. A number of state associations are considering changing the titles of their committees so as to avoid the word "grievance" and yet convey proper meaning to the public.

COMMITTEE ORGANIZATION

The effectiveness of any committee dealing with the delicate problems involved in settling complaints and grievances must necessarily depend to a great extent upon the personnel make-up of the committee. How many members should there be? How long should the members serve? How should they be elected?

Number of Members.—The sizes of the committees range from 3 to 15 members. Small committees of nine or less members are in the majority, with the most popular being a committee of five members.

Length of Service.—Tenure of office ranges from one year to "permanent." Most of the committees, however, limit tenure to five years or less, with one year and five years being the most popular.

Selection of Members.—Committees are (1) appointed by the president, (2) composed of immediate past presidents, (3) elected by the House of Delegates, (4) or appointed by the council.

Selection of Chairman.—In most of the committees, either the members elect their own chairman or the state president makes the appointment.

MEETINGS, JURISDICTION, AND PROCEDURE

Meetings.—The great majority of the committees do not hold regular sessions but meet on call, whenever the need arises. There are some exceptions, however; for example, the Boards of Supervisors of Colorado and Utah, both of which serve as the grievance committees, meet at regular monthly intervals.

Jurisdiction.—Grievance committees are usually authorized to hear and investigate complaints concerning the professional conduct and ethical deportment of individual physicians and to attempt amicable adjustment. For the most part, their authority is limited to arbitration and does not include authority to discipline any physician. When disciplinary actions seem necessary, all evidence is usually submitted to the council or proper judicial authority. In a number of instances, however, the committee may not only refer the case to the proper judicial body but may also prefer charges and prosecute as well. In at least one state the decision of the committee is final and is so understood by both parties before a hearing is scheduled.

A few states limit the jurisdiction of their grievance committees to cases referred to them by the county medical societies, thereby acting as a sort of court of appeals; however, even in these states the committee may have original jurisdiction in cases of alleged grievances originating in areas where there are no county societies or where a county grievance committee is not functioning.

Methods of Receiving Complaints.—A majority of the grievance committees hear complaints from any source—physicians, organizations, or the general public—although a few prefer that county societies review all cases first; however, in most states complaints may be made direct to the state committee as well as through a local group. All committees accept written complaints. Only a few will accept verbal complaints. Several committees are authorized to initiate investigation when they feel it is justified, regardless of whether a complaint has been filed.

Reports and Records.—Records of hearings are kept by almost all of the committees, and all make reports on their activities to the state council or House of Delegates or both. The records of committee hearings and meetings range from complete transcripts to simple listings of the number of cases handled and settled.

Relationship with Component Societies.—Most of the committees report that they will investigate and arbitrate grievances for the local societies if so requested; however, the majority of the state associations are encouraging the component societies to establish such committees, and several are assisting in the development of local committees.

COMMITTEE PUBLICITY

About half of the reporting state grievance committees stated that the committee and its functions had been publicized. The extent of such publicity was limited in many instances to an announcement at the time the committee was established. Others continue to publicize the existence of the committee as well as the results of the committee's activities. A few committees expressed the opinion that publicity would encourage ill-founded and nuisance complaints or might be looked upon as a defensive action on the part of the association. Some associations are still considering announcing the service generally, although it appears that a number of them would prefer to handle publicity through the local societies and thus, to some extent, screen the complaints received.

Opinion on the advisability of publicizing grievance committees varies from state to state. Some medical association officers believe publicity would result in a deluge of "crank" complaints. This view has proved to be only partially correct, according to reports from committees that have been in operation several years. The consensus seems to be that this type of complaint is common during the first few months of operation, but, after a committee has been active for some time, the number of such complaints usually tapers off.

Other association officers, however, point out that the ethical physician has nothing to fear and that the quickest way to halt criticism is to face it squarely and openly. According to them, the existence of a grievance committee is not in itself sufficient to correct and eliminate existing abuses. It must be active if it is to be the means of ending malicious rumor and gossip that may bring harm to the individual physician and to the medical profession as a whole.

Where a person has actually been the victim of unprofessional or unethical conduct, the bringing of such complaints before the grievance committee affords the profession an opportunity to take action against the small minority who break faith and thereby reflect on the profession as a whole. On the other hand, when a physician has been unjustly criticized or condemned, it is to the benefit of the physician and the entire profession to clear the record of the individual physician. The grievance committee is a protective mechanism for both the public and the medical profession.

MEDICAL MOTION PICTURES

The Inner Ear (A Cinematographic Study on Some Aspects of Its Anatomy, Physiology, and Pathology): 16 mm., color, sound, showing time 35 minutes. Prepared in 1951 by H. G. Kobrak, M.D., Chicago. Procurable on loan or purchase from Doho Chemical Corporation, 100 Varick St., New York 13, and on loan from Medical Film Guild, 167 West 57th Street, New York 19.

Using a dental drill and a dissecting microscope, various parts of the inner ear are exposed on animals and human cadavers. In order to visualize the structures of the inner ear it is necessary to develop four distinct methods: (1) optical enlargement to overcome the smallness of the structures, (2) time magnification to overcome the rapidity of the phenomena, (3) artificial transparency of thin membranes in order to see the contents of the membranous labyrinth, and (4) installation of small particles in order to see hydrodynamic phenomena in the cochlea.

By combining these four methods, it is possible to expose and to photograph the mammal utricle and saccule in their full size, as three dimensional structures. The semicircular canals of fish are demonstrated, and the contents of the ampulla are made visible by the artificial transparency of the wall. It is demonstrated that the cupola extends through the whole lumen of the ampulla, which corroborates the previous claims of Steinhausen and Dohlman. The acoustic function of the inner ear is shown by observation of the cochlea through windows in the otic capsule. Acoustic vibrations of the stapes footplate, the basilar membrane, and the adjacent intralabyrinthine fluids are shown through windows at various places in the otic capsule. It can be demonstrated that tones of different pitch give different vibratory patterns in the cochlea, but a full understanding of the cochlear dynamics cannot be demonstrated as yet. Ménière's disease is demonstrated by its symptomatology and histological findings. The acoustic reflex of the muscles of the middle ear is demonstrated at length. Experimental demonstrations are given which show that the most likely function of the intratympanic muscle is the protection of the inner ear against strong acoustic stimulation.

The film shows a lag between the sound and the counteraction of the tensor tympani muscle, which shows that this muscle is not in a position to protect the ear against explosions and sudden sounds; this point might have been elaborated upon in the narration. There are views of the semicircular canals from several angles, and these sequences could be edited appreciably without detracting from the picture. The description of Ménière's disease is incomplete. It would be better to leave this section out altogether and concentrate on physiology.

In general, this is an excellent presentation. It represents an outstanding achievement in the progress of medical photography, and the author should be congratulated for this valuable contribution. It is recommended for medical students in connection with their study of anatomy and physiology of the ear and will also be of interest to otologists, audiologists, acoustic physicists, physiologists, and experimental psychologists who are interested in problems of hearing.

Glaucoma: What the General Practitioner Should Know: 16 mm., color, sound, showing time 22 minutes. Produced in 1951 by Sturgis-Grant Productions, New York. Procurable on loan or purchase from Committee on Glaucoma, National Society for the Prevention of Blindness, 1790 Broadway, New York 19.

This film has been made to bring home to the general practitioner the high incidence of blindness due to glaucoma so that he will be on the watch for signs and symptoms of its existence in his patients, to show him how to recognize these signs and symptoms, and to point out the necessity of referring such patients to an ophthalmologist for a definitive diagnosis and treatment immediately. After a discussion of statistical facts about glaucoma there is a description of two cases: one, a man with acute glaucoma, and the other, a woman with chronic glaucoma. The patient with chronic glaucoma visits the general practitioner and is referred by him to the ophthalmologist. Early in the film there is a discussion of the formation and drainage of the aqueous, the maintenance of intraocular pressure, and the effects of increased pressure. The difference between congestive glaucoma, which may be either acute or chronic, and chronic simple or noncongestive is explained.

The effect of increased pressure on various parts of the eye is shown diagrammatically. The technique of tonometry done by the general practitioner using the standardized Schiøtz tonometer is briefly shown, as well as a simple test for field of vision using a white test object. The general practitioner also uses the ophthalmoscope. Unfortunately, a picture of what he observes is not shown. The ophthalmologist is shown examining the patient, using slit-lamp, gonioscope, perimeter, and tangent-screen. The dark-room and water-drinking tests are discussed as examples of useful tests for the ophthalmologist. Treatment is discussed briefly, with mention of miotics, such as pilocarpine and eserine and with diagrams showing certain types of remedial surgery, such as basal iridectomy, cyclodialysis, sclerectomy, iridencleisis, and cyclodiathermy. The film ends with the ophthalmologist thanking the general practitioner for the referral and emphasizing the need for continued supervision in order to control glaucoma. The photography, animation, and narration are well done. The film is recommended for general practitioners.

Radical Groin Dissection Malignant Melanoma: 16 mm., color, silent, showing time 17 minutes. Prepared by Jack M. Farris, M.D., Los Angeles. Sponsored by the Moore White Foundation, Los Angeles. Produced in 1951 by and procurable on rental or purchase from Billy Burke Productions, 7416 Beverly Blvd., Hollywood 36.

This film demonstrates a radical removal of a previously biopsied malignant melanoma site. It would have been helpful and would not have broken the continuity of the procedure if the formation of the flap of this phase of the procedure had been shown. The film continues by showing a radical groin dissection of the lymphatic elements. This is accomplished through an incision, which extends from the femoral triangle upward into the abdomen and parallel with the inguinal ligament. The vascular contents of the femoral triangle are dissected and exposed, and the lymph glands are removed. The abdominal dissection is accomplished by cutting through both the roof and floor of the inguinal canal. The iliac vessels are demonstrated, and the glandular elements are dissected and removed. It would have been well to either show a photomicrograph of one of the lymph glands removed or to state the microscopic findings. The photography is excellent. The technique is good, and this film can be recommended for surgeons, residents, and medical students.

V 14
1952

MEDICAL LITERATURE ABSTRACTS

UNITED STATES

A.M.A. Arch. Pathology, Chicago

52:403-488 (Nov.) 1951

*Infarction of Brain Without Thrombosis: Analysis of 100 Cases with Autopsy. S. P. Hicks and S. Warren.—p. 403.

Studies on "Alkaline" Phosphatase Associated with Regenerating Connective Tissue Fibers. B. S. Gould and N. I. Gold.—p. 413.

Hepatic Necrosis Induced by Dietary Means: III. Effect of Various Dietary Modifications on Liver Lipid Fractions and on Development of Necrosis. M. R. Abell and J. M. R. Beveridge.—p. 423.

Id.: IV. Conditions Affecting Production and Prevention of Massive Liver Necrosis. M. R. Abell and J. M. R. Beveridge.—p. 428.

Dynamics of Inflammation and of Repair: II. Chemotactic Substances in Normal Tissues. V. H. Moon and G. A. Tershakovec.—p. 441.

Effect of Various Pathological Conditions on Copper Content of Human Tissues. E. Pedrero Jr. and F. L. Kozelka.—p. 447.

Effect of Copper on Hepatic Tumors Produced by 3'-Methyl-4-Dimethylaminoazobenzene. E. Pedrero Jr. and F. L. Kozelka.—p. 455.

Histochemical Analysis of Pathological Mineral Deposits at Various Sites, with Discussion of Methods Used. H. Bunting.—p. 458.

*Single Coronary Artery: Report of Two Cases. L. A. Stapley and J. E. Edwards.—p. 470.

Pulmonary Adenomatosis: Report of Case Demonstrating Peculiar Histological Changes in Certain Bronchioles. W. Gepts.—p. 473.

Anomalous Cardiac Blood Vessel Communicating with Right Ventricle: Observations in Case of Pulmonary Atresia with Intact Ventricular Septum. R. R. Williams, G. B. Kent Jr. and J. E. Edwards.—p. 480.

Brain Infarction Without Thrombosis.—At necropsy in 60 of 100 cases of fatal cerebral infarction, no mechanical occlusion of cerebral vessels by thrombosis, embolism, or arteriosclerosis was found, so that some other explanation for the infarction was required. The brain vessels were examined for evidence of other factors that were possibly responsible, such as cerebral arterial spasm, systemic circulatory failure, severe arteriosclerosis, and vascular hypertension. The findings were compared with those in a previously reported series of 118 cases of the hemorrhagic type of apoplexy. A common feature of hemorrhagic or infarctive apoplexy (except that caused by aneurysm) is localized cerebral ischemia. In most nonthrombotic cases the ischemia results from intrinsic focal reduction of blood flow that pathologically and clinically is best attributed to spasm of arteries and arterioles, not necessarily to the point of complete occlusion. In only a few cases could systemic circulatory failure associated with severe cerebral arteriosclerosis be implicated as a primary cause of the stroke. Probably little vasoconstriction is necessary to produce the ischemia, for interstitial edema was an outstanding gross and microscopic characteristic of the apoplectic lesions. Cerebral edema as a complication of apoplexy is discussed, and it is suggested that sodium retention in heart failure and the hypertensive state often is an aggravating factor. It is concluded that apoplexy is an ischemic disease of the brain directly caused most often by cerebral vasospasm, less often by thrombosis, and least often by systemic circulatory failure, embolism, or arteriosclerosis.

Single Coronary Artery.—A single coronary artery was revealed by necropsy in a 77-year-old man who died of carcinoma of the esophagus and in a 44-year-old woman who died of widespread malignant lymphoma. There are two main groups of single coronary arteries in adults. In one group the vessel follows the distribution of a single artery to supply the entire myocardium, and the first case was an example of this type. In the other group a single vessel originates from a single ostium and immediately branches into arteries that soon follow the distribution pattern of the right and left coronary arteries, a type represented by the second case. Explanation of this anomaly by absence or ectopia of the anlage of a coronary artery is possible, although definite conclusions cannot be drawn from study of fully developed hearts.

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Titles marked with an asterisk (*) are abstracted.

American Journal of Medicine, New York

11:535-664 (Nov.) 1951. **Partial Index**

Days at the Pennsylvania Hospital During Its First Century. E. B. Krumbhaar.—p. 540.

Account of Bilious Remitting Fever, as It Appeared in Philadelphia, in Summer and Autumn of Year 1780. B. Rush.—p. 546.

Observations on Duties of Physician, and Methods of Improving Medicine. Accommodated to Present State of Society and Manners in the United States. B. Rush.—p. 551.

Long Follow-Up: A Compensation of the Aging Physician. O. H. P. Pepper.—p. 572.

Recent Trends in Poliomyelitis Research. J. R. Paul.—p. 577.

Exophthalmos in Light of Current Anti-Thyroid Therapy. H. M. Thomas Jr.—p. 581.

Place of Psychiatry in Medicine. E. D. Bond.—p. 588.

Hemochromatosis. A. Marble and C. C. Bailey.—p. 590.

Hypercholesteremia with Predisposition to Atherosclerosis: Inborn Error of Lipid Metabolism. D. Adlersberg.—p. 600.

Periarteritis Nodosa: Report of Case Treated with ACTH and Cortisone. W. L. Mundy, W. G. Walker Jr., H. A. Bickerman and G. J. Beck. —p. 630.

Trichinosis: Case Report with Observations of Effect of Adrenocorticotropic Hormone. W. M. Davis and H. Most.—p. 639.

Infarction of Stomach: Report of Three Cases of Total Gastric Infarction and One Case of Partial Infarction. E. B. Cohen.—p. 645.

Ball Thrombus of Right Auricle. R. S. Radding.—p. 653.

Disseminated Visceral Torulosis Without Nervous System Involvement: With Clinical Appearance of Granulocytic Leukemia. S. Zelman, R. H. O'Neil and A. Plaut.—p. 658.

Endocrinology, Springfield, Ill.

49:565-676 (Nov.) 1951. **Partial Index**

Effects of Hypophysectomy, Growth Hormone, Thyroxin and Food Intake on Cathepsin Activity of Rat Tissues. J. C. Mathies, L. Palm and O. H. Gaebler.—p. 571.

Effect of Stress upon Ketosteroid and Non-Carbonyl Lipoid Content of Adrenal Cortex of Rat. N. Rabinovici.—p. 579.

Comparison of Water and Saline Hydration on Diuretic Action of Sympathomimetic Agents. V. A. Drill and W. R. Bristol.—p. 589.

Effects of Cortisone in Vivo on Oxidative Metabolism of Rat Adrenal. T. L. Sourkes and P. Heneage.—p. 601.

Fluid and Electrolyte Shifts in Hydrated Adrenalectomized Rat. R. C. Frost and R. V. Talmage.—p. 606.

*Hyperplasia and I^{131} Uptake of Guinea Pig Thyroid During and After Chronic Propylthiouracil Treatment. S. A. D'Angelo, K. E. Paschkis, A. Cantarow and others.—p. 624.

Production of Diabetes and Increased Erythrocyte Sedimentation Rate by Purified Growth Hormone. J. Campbell, H. P. Lei and I. W. F. Davidson.—p. 635.

Effect of Growth Hormone on Muscle and Skin Collagen in Neonatal Thyroidectomized Rats. R. O. Scow.—p. 641.

Significance of Gomori Staining of Basophils of Rat Pituitary. H. D. Purves and W. E. Griesbach.—p. 652.

Effect of Epinephrine and Insulin on Plasma Potassium Level. A. Dury. —p. 663.

Thyroid Hyperplasia and Uptake of Radioactive Iodine.—Immature female guinea pigs (250 to 300 gm. body weight) were given propylthiouracil for from 2 to 160 days. It was found that chronic administration of propylthiouracil induced marked hyperplastic changes in the thyroid gland, with weight increased nine to ten times after 100 to 160 days of uninterrupted treatment. The uptake of radioactive iodine (I^{131}) by the thyroid (per milligram of wet tissue) was decreased appreciably in animals receiving the propylthiouracil. The degree of depression was as great with short (2 days) as with long periods (160 days) of treatment and occurred before any anatomic changes were visible in the gland. Total radioactivity in the thyroid eventually exceeded normal when there was enough tissue to offset decreased uptake. Uptake of radioactive iodine became greater than nor-

mal on withdrawal of propylthiouracil. The rebound in uptake was increased in proportion to the duration of previous treatment and paralleled the course of the hyperplasia. Increased avidity of thyroid tissue for radioiodine was demonstrable, however, before anatomic change was evident in the gland. The augmented efficiency and increase in tissue mass resulted in thyroid collections of radioiodine 10 to 20 times greater than normal. Withdrawal of the goitrogen arrested the thyroid hyperplasia and resulted in considerable deposition of colloid. The observations suggest that the increased avidity of thyroid tissue for I^{131} after withdrawal of the goitrogen cannot be accounted for entirely by anatomic changes, but may reflect a change in cellular mechanism, presumably enzymatic, in response to prolonged stimulation with endogenous thyrotropic hormone.

Florida Medical Association Journal, Jacksonville

38:383-450 (Dec.) 1951

*Strokes: Their Diagnosis and Treatment. R. E. Strain and I. Perlmutter. —p. 401.
Cancer of Prostate. J. Q. Perry and A. J. Butt.—p. 406.
Disabling Conditions of Cervical Spine. F. H. Albee Jr., E. L. Jewett and E. J. Powers.—p. 410.
Fat Embolism: Report of Fatal Case. M. M. Sayet and E. W. Cullipher. —p. 416.
Intra-Abdominal Lymphangioma. R. R. Killinger, S. S. Lombardo and D. B. McRae.—p. 418.

Strokes: Diagnosis and Treatment.—The term "stroke" generally means that the patient has had a sudden paralysis. If blood is found in the spinal fluid, there is no hesitancy in saying the patient has had a cerebral hemorrhage. If no blood is found in the spinal fluid, a diagnosis of cerebral thrombosis is made. Strain and Perlmutter feel that the neurologist may be able to benefit patients with suspected cerebrovascular accidents if he sees them early and uses proper methods of study. Percutaneous cerebral angiography with a 35% solution of iodopyracet (diodrast®) introduced by inserting a needle through the skin into the carotid artery is a safe, simple, and quick method of studying the vascular system of the brain. It requires specialized x-ray equipment, a little skill, and split second teamwork with x-ray technicians. The authors performed this test over 100 times during the past year without serious complications. Case histories cited by the authors show that lesions like cerebral abscess, glioblastoma, tumor nodules, angiomas, or subdural hematoma were disclosed by percutaneous cerebral angiography in patients with "stroke" in whom a cerebrovascular accident was suspected. The more exact diagnosis of these patients will permit effective treatment of many. The authors feel that cerebral angiography should be used more frequently in patients with "strokes."

Iowa State Medical Society Journal, Des Moines

41:447-480 (Nov.) 1951

Use of Cortisone in Rheumatic Diseases. L. E. Ward.—p. 447.
The Traumatic Abdomen. J. P. Cogley.—p. 451.
*Cornpicker Accidents of Upper Extremity. C. O. Adams.—p. 454.
Use of Conditioned Reflex and Antabuse in Therapy of Alcoholism. W. E. Ash and J. D. Mahoney.—p. 456.
Physiology of Conjunctival Sac. A. M. Dean.—p. 459.

41:481-528 (Dec.) 1951

Carcinoma of Breast, Symptoms and Diagnosis. L. P. River, J. Silverstein and E. F. Dolehide.—p. 481.
Acute Cholecystitis in the Aged. W. O. Preece.—p. 485.
Diagnosis and Surgical Treatment of Posterior Wall Duodenal Ulcer. H. I. Down.—p. 488.
Orthoptics. H. O. Gardner.—p. 491.
From Leeches to Anti-Biotics. G. F. Lull.—p. 503.

Cornpicker Accidents of the Arm.—The power that operates the cornpicker is usually transmitted by a spinning power takeoff bar. It is possible for a farmer to get his glove, sleeve, or hand caught on this spinning bar, and the entire arm may be rapidly wrapped about it. There may be multiple metacarpal fractures. There may be a fracture of the midshaft of the ulna, and the shaft of the radius. There may be fractures of the humerus as well, and if the motor is not stopped, the man may be killed. The numerous gears and chain drives of the cornpicker may cause injuries of the fingers and hand. The author briefly comments on repair of the digital nerves and tendons and amputation of fingers. There are also two sets of rollers, one of which often becomes clogged with cornstalks, and while cleaning them out, the machine may be left running so that the power of the rollers helps the cleaning process. This is dangerous. The snapping rolls may cause multiple fractures, but oftenest a severe crushing injury results. One of the most important factors in the treatment of these crushing injuries is to combat the post-traumatic edema by keeping the arm high until the acute edema is under control. The treatment of the fractures usually can be combined with elevation of the extremity. Injuries sustained when the arm becomes entangled in the husking rolls of a cornpicker are even more serious. The clearance between these rolls is narrow, and any part that enters between them is usually damaged beyond repair. The victim is often able to jerk the hand out, usually with avulsion of the damaged portion. Amputations of the hand or arm are sometimes mandatory, but if there is question regarding amputation, delay with elevation of the extremity and supportive therapy will answer it and may save parts or extremities that might otherwise be amputated. A case history is presented to illustrate this point.

Journal of Bone and Joint Surgery, Boston

33A:825-1102 (Oct.) 1951. **Partial Index**

Surgical Rehabilitation of Hand and Forearm Disabled by Poliomyelitis. C. E. Irwin and D. L. Eyler.—p. 825.
Repair of Extensor-Tendon Insertions in Fingers. H. M. Nichols.—p. 836.
Arthritic Deformities of Wrist and Fingers. A. Steindler.—p. 849.
Preservation and Clinical Use of Freeze-Dried Bone. F. P. Kreuz, G. W. Hyatt, T. C. Turner and A. L. Bassett.—p. 863.
*Clinical Evaluation of Merthiolate Bone Bank and Homogenous Bone Grafts. F. C. Reynolds, D. R. Oliver and R. Ramsey.—p. 873.
Rupture of Brachial Artery Accompanying Dislocation of Elbow or Supracondylar Fracture. H. C. Spear and J. M. Janes.—p. 889.
Evaluation of Healed Colles' Fractures. J. J. Gartland Jr. and C. W. Werley.—p. 895.
Anomalous Tarsal Bone. A. B. Hirschtick.—p. 907.
The Skull in Paget's Disease. R. R. Goldenberg.—p. 911.
Osteopetrosis: Case Report, Autopsy Findings, and Pathological Interpretation. Failure of Treatment with Vitamin A. J. Cohen.—p. 923.
*Therapeutic Acceleration of Bone Age in Osteogenesis Imperfecta: Case Report. P. B. Wright, S. L. Gernstetter and R. B. Greenblatt.—p 939.
Study of Displaced Capital Femoral Epiphyses. M. Cleveland, D. M. Bosworth, J. N. Daly and W. E. Hess.—p. 955.
Danger of Exposure to X-Rays by "Blind-Nailing" Technique. C. A. Rowe.—p. 967.
Clinical Applications of Ergography. F. A. Hellebrandt and S. J. Houtz. —p. 968.
Arthrodesis of Knee: Comparison of Compression Method with Non-Compression Method. H. D. Morris and R. S. Mosimain.—p. 982.
Rotation of Forearm: Experimental Study of Pronation and Supination. R. D. Ray, R. J. Johnson and R. M. Jameson.—p. 993.

Merthiolate Bone Bank and Homogenous Bone Grafts.—In a previous report Reynolds and associates discussed the clinical use of homogenous bone grafts from the thimerosal (merthiolate®) bone bank. On the basis of more extensive clinical experience, some of their earlier opinions have been revised. In 212 operations in which bone from the bone bank was used, 121 patients with 129 such operations were followed for one year or more. The authors believe that fixation and replacement are accomplished in a similar manner in autogenous and homogenous bone grafts, but that some of the cells of an autogenous graft are capable of survival. This could account both for the more rapid union of the autogenous graft as compared with homogenous graft and for the greater number of successes with autogenous grafts. With thimerosal-preserved bone the fixation and replacement are retarded, resulting in a higher percentage of failures (30.24% in this series). The thimerosal bone bank provides, however, a satisfactory method of preserving bone, and there has been no evidence of sensitivity to thimerosal. Many of the failures were not due to the homogenous bone grafts but to poor surgery. Others can be attributed to the injudicious use of bone grafts, and failure would probably have occurred with an autogenous graft. The authors now feel that homogenous grafts should be considered useful aids in orthopedic surgery rather than as universal substitutes for autogenous bone. Bone from the bank should be used when it is not feasible to use autogenous bone, such as: (*1*) when the available supply of autogenous bone does not fulfill the requirements; (*2*) when taking an autogenous bone graft will materially increase the hazard of the operative procedure; (*3*) when there is a chance that the graft will be lost because of infection; (*4*) during an

V 14
1952

operation when it is decided that a bone graft would be useful and no previous plans for taking a graft have been made; and (5) where the bank bone is used as an internal splint when the condition would not justify taking an autogenous graft.

Accleration of Bone Age in Osteogenesis Imperfecta.—When the child whose case is reported was 4 months old, roentgenograms showed an oblique fracture of the lower third of the left femur. The fracture healed rapidly. She again entered the hospital at the age of 2 years and 3 months because of a transverse, subperiosteal fracture of the lower third of the left femoral shaft. Following the second fracture, dietary therapeutic measures were instituted. During the next four years, she had five additional fractures of the long bones of the lower extremities, all from trivial or unrecognized injuries. Hormonal therapy was started following the fourth fracture, at the age of 4 years and 9 months, and was continued for 10 months. The medication consisted of 0.1 mg. of diethylstilbestrol daily and 10 mg. of methyltestosterone on alternate days. This combination produced a puberal development of the breasts, prominence of the mons veneris, and coarse pubic and axillary hair. During a 10-month period of hormone administration no fractures were sustained. Following the estrogen-androgen therapy, no changes were shown by roentgenograms except a striking acceleration of ossification centers. About three weeks after the medication was discontinued she had a fifth fracture. The secondary sexual characteristics regressed in the 10 months following cessation of the hormone treatment. Since the stimulus has been removed and the epiphyses have not prematurely united, it is assumed that the skeletal age will be arrested until the chronological age approaches it. Aluminum acetate therapy will be continued, if it is well tolerated and if no evidence of rickets develops. Guarded activity and cautious weight-bearing will be enforced until maturity. It is hoped that at that time there will be a spontaneous arrest of the fragility of bone, since it has been noted that the tendency to fracture diminishes after puberty. Although some patients with osteogenesis imperfecta have advanced bone age, this patient did not. The case is a striking clinical example, in which the sex hormones have accelerated osseous development in a patient with no endocrine dysfunction.

Journal of International College of Surgeons, Chicago

16:543-680 (Nov.) 1951

Cervical Ribs: Symptoms, Differential Diagnosis and Indications for Section of Insertion of Scalenus Anticus Muscle. A. W. Adson.—p. 546.
Carcinoma of Stomach: Plea for Earlier Diagnosis and More Radical Treatment. S. F. Marshall.—p. 560.
Tumors of Ovary: Endocrine and Other Rare Ovarian Growths. G. F. Douglas, G. C. Douglas and G. F. Douglas Jr.—p. 567.
Surgical Treatment of Esophageal Hiatus Hernia: Study of 42 Cases. M. X. Anderson.—p. 578.
*Evaluation of Surgical Treatment of Congenital Pulmonary Stenosis. W. J. Potts.—p. 602.
Suction Surgical Treatment of Cataract in Children: Visual Rehabilitation. O. R. Wolfe and R. M. Wolfe.—p. 608.
Treatment of Postsurgical Menopause by Implantation of Estradiol Pellets. S. D. Soule.—p. 622.
Carcinoma of Fancreas with Roentgen Pattern of Nontropical Sprue: Report of Case. M. O. Cantor and L. Haking.—p. 631.
Difficult Hernias: Use of Tantalum Mesh in Repair. A. R. Koontz.—p. 637.
Bleeding Peptic Ulcer. E. A. Connolly and R. B. Williams.—p. 644.
Splint for Treatment of Buttonhole Rupture of Extensor Tendon at Middle Finger Joint. R. E. Van Demark.—p. 649.
Bilateral Successive Coexistent Tubal Pregnancies. E. Spier.—p. 654.

Surgical Treatment of Congenital Pulmonary Stenosis.—Potts' choice of a surgical procedure for treatment of congenital pulmonary stenosis is as follows: If the patient has the typical tetralogy of Fallot with the aorta descending on the left, the chest is entered through the left fourth interspace and an aortic-pulmonary anastomosis is done; if the arch descends on the right, the chest is entered through the left fourth interspace and a subclavian-pulmonary anastomosis is done. Only when the patient is less than one year of age, has a right-sided aortic arch, and cannot live without surgical relief is an aortic-pulmonary anastomosis performed on the right side. In patients who have "isolated" pulmonary stenosis a left submammary approach is made, and the stenotic valve is incised with an expanding valvulotome and enlarged with a dilator introduced through the wall of the right ventricle. Of 309 patients operated on, 270 were subjected to a shunt operation for the tetralogy of Fallot. Of these 270, 110 were between the ages of 11 days and 3 years and 25 of them died, a mortality rate of 23%; of the remaining 160 patients between the ages of 3 and 16 years, 4 died, a mortality rate of 2.5%. Of 15 patients who underwent valvulotomy for isolated pulmonary stenosis, 1 died. Of 24 patients for whom a shunt operation was impossible, exploratory procedures terminated fatally in 11, a mortality rate of 45%. The mortality rate of congenital pulmonary stenosis is high in the first two years of life, but if a child lives into its third year the chance of survival after operation is 97%. The prognosis as to the life span is indeterminable at present. The author stresses that expert induction of anesthesia by an anesthesiologist is indispensable for the surgical treatment of congenital pulmonary stenosis; anesthesia may be induced by ether, cyclopropane, and oxygen, and ether may usually be eliminated after intubation. To prevent increased oxygen consumption associated with rise of temperature, cooling during operation was practiced routinely by placing a rubber mattress filled with cold water on the operating table beneath the moderately cyanotic child. Ice water was used for the extremely cyanotic child. Death from anoxia during operation was thus almost eliminated.

Journal of Investigative Dermatology, Baltimore

17:255-302 (Nov.) 1951

Lipophilic Yeastlike Organisms Associated with Tinea Versicolor. M. A. Gordon.—p. 267.
Studies on Serum Lipids in Acne Vulgaris. F. Kalz, A. Janauskas and C. Fournier.—p. 273.
Chemistry of Human Sebaceous Gland: II. Analysis of Human Sebaceous Material from Individual Orifices. K. Schmidt-Nielsen, R. R. Suskind and E. Taylor.—p. 281.
Multiple Hairs (Flemming-Giovannini): Report of Two Cases of Pili Multigemini and Discussion of Some Other Anomalies of Pilary Complex. H. Pinkus.—p. 291.

Journal of Neurosurgery, Springfield, Ill.

8:547-684 (Nov.) 1951

Surgical Treatment of Acoustic Tumors. P. C. Bucy.—p. 547.
Experimental Evaluation of Cerebral Angiography. G. A. Smith, C. M. Caudill, G. E. Moore and others.—p. 556.
Role of Small Angiomatous Malformations in Production of Intracerebral Hematomas. G. Margolis, G. L. Odom, B. Woodhall and B. M. Bloor.—p. 564.
Spontaneous Subarachnoid Hemorrhage in Intradural Tumors of Lumbar Sac: Clinical Syndrome. E. F. Fincher.—p. 576.
Experimental Evaluation of Certain Contrast Media Used for Cerebral Angiography: Electroencephalographic and Histopathological Correlations. B. M. Bloor, F. R. Wrenn Jr. and G. Margolis.—p. 585.
Value of Electromyography in Neurology and Neurosurgery. W. W. Woods and P. A. Shea.—p. 595.
*Use of Gelfoam Film as Dural Substitute: Preliminary Report. W. G. Scheuerman, F. Pacheco and R. A. Groff.—p. 608.
Serial Electroencephalography in Acute Head Injuries. R. E. Dawson, J. E. Webster and E. S. Gurdjian.—p. 613.
Angiographic Diagnosis of Spontaneous Thrombosis of Internal and Common Corotid Arteries. H. C. Johnson and A. E. Walker.—p. 631.
Arteriographic Demonstration of Spasm of Intracranial Arteries with Special Reference to Saccular Arterial Aneurisms. A. Ecker and P. A. Riemenschneider.—p. 660.

Absorbable Gelatin Film as a Dural Substitute.—This report is concerned with the use of absorbable gelatin (gelfoam®) film as a dural substitute. This gelatin film is supplied sterilized in a sealed envelope, 4 by 5 in. (10.2 by 12.7 cm.) in size. It is slightly thicker than "cellophane," is transparent, and can be cut to shape. When moistened, it becomes rubbery and thus molds to contours, but tears easily. If care is exercised, it can be sutured loosely to the dura. It can be resterilized in dry heat at 140 C for four hours. No special storage or handling is necessary and the cost is low. After experimental use in dogs, the film was used clinically in 24 patients. In two patients who died at six and eight days postoperatively, autopsy revealed that the film had the same rubbery consistency as when introduced. In patients with craniotomies reoperated on within 30 days, the film was found intact; between 30 and 40 days it had become fragmented, and after 90 days it was either completely absorbed or only a few small fragments remained. The gelatin film is used to provide a barrier to the mesothelial cells of the dura at the dura-arachnoid junction, because the outer cellular layer of the arachnoid is obviously injured at operation. Since experiments

have shown that at least 70 days are required for the film to be absorbed, there is more than sufficient time for the cells of the arachnoid to regenerate and thus set up a natural barrier to the formation of adhesions. The authors conclude that absorbable gelatin film is an effective dural substitute and prevents adhesions. The fact that the film is absorbed in about 80 to 90 days overcomes the disadvantage of foreign materials. The ease of handling and its low cost permits wider use than fibrin film, yet the gelatin film has all the advantages of fibrin film.

Laryngoscope, St. Louis

61:1047-1134 (Nov.) 1951. **Partial Index**

Acromegaly, with Special Reference to Otolaryngological Aspect. N. E. Nachlas.—p. 1096.
*Multiple Papilloma of Larynx: Preliminary Report of Four Cases Treated with Terramycin. I. M. Bradburn.—p. 1105.
Otitis Externa in Puerto Rico: Clinical and Bacteriological Study of 82 Cases. M. Alonso.—p. 1114.
Pearly Tumor of Cerebellopontine Angle: Report of Case with Reversible Deafness. M. L. Lewis Jr. and D. H. Echols.—p. 1123.

Multiple Papillomas of Larynx.—It seems possible that a virus plays some part in the production of laryngeal papillomas in children. The lesions appear as grayish-pink, mulberry-like nodules projecting from the mucosa, varying in size from a few millimeters in diameter to lesions that completely fill the larynx. They may occur anywhere in the larynx, trachea, bronchi, epiglottis, or pharyngeal wall, but are most commonly found on the true cords and ventricular bands. They are benign, sessile, or pedunculated lesions with a vascular connective tissue core covered by proliferated stratified squamous epithelium. They arise from the mucous membrane and do not infiltrate below the basement membrane. In diagnosing the cause of chronic progressive hoarseness in a child, papilloma, vocal nodules, "screamers' nodes," chronic laryngitis, congenital cysts and webs, congenital laryngeal stridor, laryngotracheitis, hypertrophy of the ventricular bands, foreign body, paralysis of the recurrent laryngeal nerve, syphilis, and tuberculosis must be considered. There are many treatments for multiple papilloma but none of them produce consistent results. The papillomas tend to disappear at puberty. Gentle forceps removal under direct laryngoscopy is perhaps the best surgical procedure. This may be augmented by tracheotomy to obtain an adequate airway. Four cases are reported in which terramycin was given following removal by forceps. Two patients were free of papilloma after two months of treatment. Two patients were improved but still had papilloma. Terramycin given in relatively large doses after surgical removal appears to have some beneficial effects in multiple papilloma. It seems necessary to give it in a dosage of 50 mg. per kilogram of body weight per day, for not less than two months. The apparent effect of terramycin on multiple papilloma supports the theory of a virus etiology of multiple papilloma.

Medical Annals of District of Columbia, Washington

20:583-640 (Nov.) 1951

*Management of Critical (Massive) Gastroduodenal Hemorrhage. C. S. White, E. C. Wilson Jr. and C. S. White Jr.—p. 583.
Types of Psychotherapy. R. A. Cohen.—p. 589.
Chronic Alcoholism. R. P. Odenwald.—p. 596.
Idiopathic Simple Arterial Thrombosis: Report of Case. P. A. Reed.—p. 602.
Sporotrichosis: Report of Case in Greater Metropolitan Washington. M. A. Weiner.—p. 606.

Management of Critical Gastroduodenal Hemorrhage.—White and associates suggest that "critical" should be substituted for "massive" in reference to serious hemorrhage associated with gastric and duodenal ulcers. In trying to define critical hemorrhage, the authors state that, although it is impossible to measure the blood lost, it is possible to measure the quantity and quality of the blood remaining in the vascular system. Although no hard and fast rule can be applied, it has been proposed that if the red blood cell count is 2,500,000 or less or the hemoglobin level 7 gm. or less per 100 cc., or, if 2,500 cc. of transfused blood is required to restore the patient's blood to its normal volume and cellular content, it can be stated that the patient has had a critical hemorrhage. A more accurate index can be obtained by estimating the blood volume by the Evans' method. The authors show that it is impossible to differentiate exactly those that may be expected to recover with medical treatment only and those who should be treated surgically. They stress the following points: 1. Multiple transfusions are mandatory and arterial transfusions may be necessary. 2. Patients over 45 years of age have a higher mortality with critical hemorrhage than those below that age, but factors other than hemorrhage contribute to the mortality. 3. If repeated transfusions are not followed by cessation of bleeding, as determined by blood pressure and blood examination, operation is indicated. 4. Shock is not a contraindication to operation if ample blood for transfusion is available. 5. Gastric resection is the operation of choice for the gross ulcer. 6. Ligation may suffice in the small necrotic type of ulcer.

Military Surgeon, Washington, D. C.

109:683-756 (Dec.) 1951. **Partial Index**

Practice of Field Medicine on Operation "Killer." J. F. Harris.—p. 683.
Battle Wounds of Colon and Rectum. B. P. Colcock.—p. 688.
Medical Support for Mountain Fighting in Korea. P. T. Buerger.—p. 694.
Eye Conditions Similar to Those Produced by Modern Warfare. R. I. Pritkin and M. L. Duchon.—p. 706.
Dynamic Group Experience in Military Hospital Paraplegic Unit. R. J. Margolin and C. L. Rose.—p. 712.
Duodenal Ulcer: Pathogenetics, and Re-Evaluation of Therapeusis. R. de R. Barondes.—p. 720.

Missouri State Medical Assn. Journal, St. Louis

48:845-940 (Nov.) 1951

Congenital Malformations Remedial During Early Infancy. J. A. Bigler.—p. 861.
Oral Cholecystography: Experiences with Newer Cholecystopaques. W. G. Scott and W. A. Simril.—p. 866.
Roentgen Therapy in Bursitis of Shoulder: Analysis of 50 Cases Using Both Deep and Superficial Techniques. C. M. Witt and P. F. Tittington.—p. 870.
Strangulated Femoral Hernia: Review of 108 Cases. J. C. Peden Jr.—p. 873.
*Study of Sympathetic Blocks: Consideration of Factors Affecting Clinical Results. B. W. Harned and F. V. Theis.—p. 882.

48:941-1020 (Dec.) 1951

The Spinal Puncture. D. F. Coburn.—p. 957.
Eye Care in Battalion Aid Stations. E. B. Alvis.—p. 958.
Surgical Treatment of Achalasia. W. A. Bowersox and R. S. Kieffer.—p. 960.
New Agent for Treatment of Migraine and Histaminic Cephalalgia. R. E. Ryan.—p. 963.
The Physician and Oral Health in Children. J. A. Bigler.—p. 966.

Results of Sympathetic Blocks.—Interpretation of the results of sympathetic block is uncertain since it is not possible to differentiate organic occlusion of the vessels and failure of the block. Harned and Theis describe investigations of the effect of proved sympathetic blocks in patients whose symptoms might be benefited by temporary sympathetic nerve block or those who were considered for sympathetic neurectomy. Oscillometric readings were taken on the ankle, leg, and thigh; peripheral skin temperature was determined at selected sites on the foot, toes, and leg; and skin resistance determinations were repeated three times before the nerve block to assure stabilization of these determinations. After the sympathetic nerve block the oscillometric and skin temperature readings were repeated. Then, the patient was warmed by being covered with blankets and an electric pad, and the skin resistance studies were repeated. The resistance studies were made with the neurodermometer, a specially constructed ohmmeter. The elimination of sweat gland activity resulting from the block greatly increases the skin resistance to passage of minute electric currents as compared to the normally innervated areas. Skin temperature determinations are valuable in studies of this type; however, the temperature of initially warm extremities cannot be further elevated by sympathetic block, although the accompanying pain may be relieved. Oscillometric readings are rarely changed materially by sympathetic blocks, because sympathetic activity is mainly to small arterioles and capillaries, and oscillometric readings determine the tonicity of the larger arterioles and arteries. Therefore, the neurometer is the simplest and most reliable means of demonstrating the success of sympathetic blocks. The best clinical results folowing sympathetic blocks are in relieving pain and vascular spasm of recent origin, but blocks should be tried on even seemingly "hopeless" obliterative vascular disease.

Nebraska State Medical Journal, Lincoln

36:345-376 (Nov.) 1951

Lung Tumors as Pathologist Sees Them. W. A. Meissner.—p. 347.
Use and Abuse of Bronchography in Lung Disease. M. A. Kellett. —p. 350.
Prevention and Treatment of Eclampsia. L. D. Odell.—p. 352.
Subdural Hematoma in Absence of Objective Neurologic Findings. L. J. Gogela.—p. 357.
Diverticulitis May Mask Carcinoma of Colon. J. H. Brush.—p. 360.
Primary Dysmenorrhea—Its Gynecological, Physiological and Psychiatric Aspects: Review of Literature. G. R. Pullman.—p. 363.

36:377-408 (Dec.) 1951

Massive Gastro-Intestinal Hemorrhage. A. Sachs.—p. 379.
Early Diagnosis of Carcinoma of Cervix. L. S. McGoogan.—p. 382.
Myelography and Intervertebral Disc Lesions of Low Back. F. S. Webster. —p. 386.
New Concept in Management of Idiopathic Pruritus Ani: Preliminary Report. G. R. Underwood.—p. 391.
Educational Plan of American Academy of General Practice. T. D. Fitzgerald.—p. 392.
Pull-Through Operation for Ano Rectal Carcinoma. L. Anderson.—p. 394.
Clinical Electroencephalography in Convulsive Disorders. R. J. Ellingson. —p. 396.

New England Journal of Medicine, Boston

245:711-752 (Nov. 8) 1951

Neurocirculatory Asthenia, Anxiety and Neurosis. H. H. W. Miles and S. Cobb.—p. 711.
Control of Inoperable Oral Cancer with Massive Roentgen Therapy. G. White and W. R. Christensen.—p. 719.
Suicidal Dilantin (Sodium Diphenylhydantoin) Poisoning: Case Report. J. B. Tichner and C. D. Enselberg.—p. 723.
*Roentgen Therapy in Acne. G. M. Crawford, R. H. Luikart Jr. and R. F. Tilley.—p. 726.
Cerebral Palsy. E. Denhoff, V. N. Smirnoff and R. H. Holden.—p. 728.

245:753-792 (Nov. 15) 1951

Coronary Arteriosclerosis and Myocardial Hypertrophy. E. P. Connolly and D. Littmann.—p. 753.
Effect of ACTH in Trichinosis: Clinical and Experimental Study. M. A. Luongo, D. H. Reid and W. W. Weiss.—p. 757.
Fatal Transfusion Reactions from Massive Bacterial Contamination of Blood. C. W. Borden and W. H. Hall.—p. 760.
Diabetic Coma Versus Diabetic Nephropathy: Hazards of Factitious Insulin Resistance, Oliguria and Hyperkalemia. H. F. Root, R. D. Story and J. B. Cortesi.—p. 765.
Cerebral Palsy. E. Denhoff, V. N. Smirnoff and R. H. Holden.—p. 770.

Roentgen Therapy in Acne.—Results are reported for 58 patients with acne, 5 to 20 years after roentgen therapy. The acne was papulopustular in 36 patients, deeply indurated or nodular in 14, and cystic in 8. The degree of activity was moderate in 30 cases and severe in 28; the average duration had been 5.6 years. The average age of the patients at the time of roentgen therapy was 21.4, the youngest being 15 and the oldest 38. The face was treated with two exposures, each side receiving from 60 to 75 r; an additional central face dose of 15 r was given to some patients. Voltage varied from 75 to 100 kv., and unfiltered radiation was generally used. The maximum number of roentgens administered varied from 500 to 1,450. Immediate results were excellent in 35 patients, unsatisfactory in 4, and partially successful with occasional lesions observed in 19 patients. In the follow-up telangiectasia was found in nine patients, 30 to 41 years of age, five of whom had received less than 800 r. It was relatively inconspicuous and was probably due to causes other than roentgen therapy. Any group of persons between 30 and 40 years of age may show a similar incidence of telangiectasia without previous roentgen radiation. None of the patients showed atrophy, pigmentary changes, or keratoses. Best results and fewest recurrences were observed in patients who had received 1,000 to 1,200 r in an uninterrupted series of treatments.

Pennsylvania Medical Journal, Harrisburg

54:1017-1112 (Nov.) 1951

Hormone Therapy of Cancer. D. C. Hines.—p. 1045.
Cutaneous Diseases Associated with Diabetes. W. B. Guy.—p. 1052.
Valoctin Therapy in Functional Dysmenorrhea: Preliminary Report. L. Z. Goldstein.—p. 1056.
Management of Diarrhea in Infancy. J. P. Scott.—p. 1058.
Effect of ACTH and Cortisone on Skin and on Skin Diseases. H. Blank. —p. 1062.

Postgraduate Medicine, Minneapolis

10:359-458 (Nov.) 1951

*Nonoperative Treatment of Perforated Duodenal Ulcer. S. F. Seeley. —p. 359.
Post-Coronary Syndrome. N. Flaxman.—p. 367.
Biliary Tract Calculi and Associated Disease. L. T. Palumbo.—p. 370.
New Type of Plaster Apparatus for Continuous Traction and Immobilization of Cervical Spine. J. P. Chaves.—p. 377.
Treatment of Intracranial Aneurysms. J. L. Poppen.—p. 380.

Nonoperative Treatment of Perforated Duodenal Ulcer.—Seeley reviews 106 cases of perforated duodenal ulcer treated without operation. One death occurred in a patient who was being treated for a myocardial infarction with cardiac failure. The mortality rate of 0.9% (one death in 106 cases) is compared with the mortality rates in several series of cases in which surgical treatment was used. Although a mortality as low as 1.1% was reported in 1946 in 88 cases with surgical treatment, as late as 1948 a mortality of 18% was reported in 101 cases, and in a series of 15,340 cases between 1930 and 1940, the mortality was 23.4%. With nonoperative treatment immediately on admission of a patient with suspected perforation of a peptic ulcer, a Levin tube is passed, the gastric contents are aspirated, and 1.4 grain of morphine sulfate is given intramuscularly. Constant decompression of the stomach is the most important feature of the treatment. During the first 24 hours 3,000 cc. of fluid is administered intravenously, including at least 1,000 cc. of 5% glucose in isotonic sodium chloride solution and 1,000 cc. of sixth-molar sodium lactate injection. The remaining 1,000 cc. of solution was usually 5% glucose in water. The amounts of intravenously administered fluids are changed in accordance with the urinary output, the aim being to insure an average daily output of 1,500 cc. In many cases thiamine chloride, nicotinamide, riboflavin, menadione (vitamin K), liver extract, and ascorbic acid were added to the intravenous solutions. In the presence of hypoproteinemia or anemia, whole blood was given. Antibiotics and chemotherapeutic agents were given in a preparation of 1,000,000 units of penicillin, 1 gm. of streptomycin, and 2.5 gm. of sodium sulfadiazine in 1,000 cc. of isotonic sodium chloride solution or 5% glucose in water. This is given over a 12 hour period by slow intravenous drip and repeated every 12 hours until about the fifth day. Since this solution accounts for only 2,000 cc. of intravenous fluid daily, one of the solutions referred to under intravenous therapy is added to increase the total fluid intake. By the 14th day, if no complications have developed, patients are transferred to the medical service. Complications occurred in 16 of the 106 cases of perforated duodenal ulcer treated by nonsurgical means. Abscesses developed in eight patients (four subphrenic, two upper abdominal, and two pelvic). Other complications were pleural effusion in four cases, drug psychosis in two, and pneumonitis and thrombophlebitis in one case each. Seven patients were subsequently operated on for chronic duodenal ulcer, but no fluid or foreign material was found in the peritoneal cavity. Adhesions were no more numerous than when surgical closure had been done.

South Carolina Medical Assn. Journal, Florence

47:435-472 (Dec.) 1951

Antepartum Bleeding in Last Trimester. H. H. Fouche.—p. 435.
Medical Aspects of Control of Rabies. B. F. Wyman.—p. 438.
Hospital Facilities for Premature Infant in South Carolina. J. I. Waring. —p. 441.
"What Do You Get for Your $25?" W. W. Bauer.—p. 443.
Brighter Outlook for America's Cerebral Palsied. C. F. McKhann. —p. 446.
Epidermoid Carcinoma of Cervix: Statistical Study. J. L. Simpson, L. L. Hester and J. M. Wilson.—p. 448.

West Virginia Medical Journal, Charleston

47:347-376 (Nov.) 1951

Diagnosis and Treatment of Diabetic Acidosis. A. R. Colwell.—p. 347.
Surgical Complications of Diabetes Mellitus. A. R. Colwell.—p. 351.
Indications for Hysterectomy. J. L. Crites.—p. 356.
Traumatic Lesions of Urinary Bladder and Urethra (Study of 50 Cases). D. R. Gilbert and A. I. Dodson.—p. 359.

FOREIGN

Annals of Rheumatic Diseases, London

10:217-392 (Sept.) 1951

Anti-Rheumatic Activity of Several Steroids. R. Liefmann.—p. 233.
Amyloidosis in Still's Disease. J. A. James and F. G. Bolton.—p. 250.
Response of Schoenlein-Henoch Syndrome to ACTH: Report of Case with Serial Skin Biopsies. J. E. Levinson, M. Horwitz, J. P. Kulka and others.—p. 255.
Differential Tissue and Organ Anoxia in Disease: Measurement of Periarticular Oxygen Saturation Levels in Patients with Arthritis. J. W. L. Doust.—p. 269.
Punch Biopsy of Synovial Membrane. H. F. Polley and W. H. Bickel. —p. 277.
Sjögren's Disease and Rheumatoid Arthritis. S. R. Reader, H. M. Whyte and P. C. Elmes.—p. 288.
Spontaneous Rupture of Tendon of Extensor Pollicis Longus as Complication of Rheumatoid Arthritis. R. Harris.—p. 298.
*Monarticular Trauma and Rheumatoid Arthritis. M. Kelly.—p. 307.
Splenectomy in Rheumatoid Arthritis. R. Bach and J. H. Jacobs.—p. 320.
Copper Treatment of Experimental and Clinical Arthritis. W. C. Kuzell, R. W. Schaffarzick, E. A. Mankle and G. M. Gardner.—p. 328.
Rheumatoid Nodules: Study in Their Pathogenesis and Effects of Cortisone and ACTH. T. E. Hunt and A. J. Blanchard.—p. 337.
Knee Effusion in Young Adults as Early Sign of Degenerative Arthritis. R. W. Parnell.—p. 347.
Gout: Observations on Effects of Drugs on Plasma Uric Acid and Urinary Uric Acid. G. D. Kersley, L. Mandel and E. Bene.—p. 353.
Comparative Therapeutic Value of Massage with "Adrenaline Cream" and with Another Cream in Conditions Associated with Deep Pain. E. G. L. Bywaters.—p. 359.

Monarticular Trauma and Rheumatoid Arthritis.—Local trauma may result in chronic monarticular arthritis, but there are also reports that indicate that monarticular trauma may induce rheumatoid arthritis. Kelly's experience confirms that injury may produce chronic polyarthritis. In more than 50 patients of 600 observed, injury was the sole visible factor; but this study is confined to 32 patients in whom the first symptoms appeared immediately after an injury to a single joint. The joint remained painful and swollen for periods varying from one week to two years before a second joint was involved, and in most cases a number of joints were then affected in a short time. The arthritis appeared first in the opposite joint in 13 cases, and simultaneously in two symmetrical joints in 12. The persistence of chronic arthritis in an injured joint depends on two factors: further damage to the joint by overstrain, and reflex disturbance of joint physiology. The spread to other joints frequently followed overstrain or further damage to the injured joint; symmetry suggests that the change is propagated through nervous channels. It is concluded that the constitutional factor that favors the spread of the disease is not a permanent defect but a late disturbance of the nervous system induced by impulses from the damaged tissues.

British Medical Journal, London

2:1295-1358 (Dec. 1) 1951

*Adrenal Cortex and Rheumatoid Arthritis. E. C. Kendall.—p. 1295.
Influence of Unilateral Nephrectomy on Production of Experimental Arthritis in Albino Rat. R. G. Harrison.—p. 1299.
Sympathectomy and Innervation of Kidney. Z. M. El Asfoury.—p. 1304.
Haemoglobin Levels Before and After Labour. H. E. Magee and E. H. M. Milligan.—p. 1307.
Diffuse Arteritis of Unknown Origin Accompanied by Eosinophilia. K. W. Walton and D. W. Ashby.—p. 1310.
Multiple Argentaffinomata of Ileum Revealed by Secondary Growth in Epididymis. J. R. O'Brien.—p. 1315.
Argentaffin Tumor of Ileum with Perforation. I. S. Stewart and G. R. Thomson.—p. 1316.
Effects of Hyperthermia and Antibacterial Agents on Tubercle Bacilli. J. Marks.—p. 1318.
Unusual Method of Treating Hydrocephaly. A. U. Campbell.—p. 1320.

Adrenal Cortex and Rheumatoid Arthritis.—Kendall reviews the history of cortisone and corticotropin, discussing the chemical phase of investigation and the physiological and pharmacological aspects of these drugs. Then he discusses rheumatoid arthritis and its possible causes and the dosage of cortisone and corticotropin. He concludes that rheumatoid arthritis and rheumatic fever, as well as other collagen diseases, are related in pathogenesis and respond in similar ways to cortisone. Perhaps the most hopeful aspect of the study is the wide clinical application of this hormone. The unexpected and far-reaching influence of cortisone on many diseases may be produced through its control of some causative agent common to all of them. The nature of this agent is unknown, but the author agrees with Pickering and Meiklejohn that the hypothesis of the adaptation syndrome of Selye is not acceptable. Today it can be said that cortisone relieves the pain and symptoms of rheumatoid arthritis and is a life-saving measure in other syndromes, but to the clinician interested in research it will be a means of investigating many long-unsolved problems.

Irish Journal of Medical Science, Dublin

311:505-552 (Nov.) 1951

Experimental Evaluation of Antibacterial Agents in Tuberculosis Therapy. W. H. Feldman.—p. 505.
Technique of Eosinophil Counting. S. M. Shea.—p. 528.
Intravenous Pethidine. M. Murphy.—p. 535.
Action of Vibrio and Influenza Virus Enzymes and of Periodate and Trypsin on Human Red Cells. F. S. Stewart and P. N. Meenan.—p. 541.
Ringworm Species in Eire. F. O. C. Meenan.—p. 546.
*Pathognomonic Sign of Leakage of Cerebrospinal Fluid Into Subdural Space. A. A. McConnell.—p. 550.

Sign of Leakage of Cerebrospinal Fluid into Subdural Space.—Cerebrospinal fluid cannot be absorbed anywhere except from the subarachnoid space over the convexity of the brain. If the arachnoid membrane is torn, cerebrospinal fluid escapes into the subdural space, where it remains indefinitely. This leakage of cerebrospinal fluid is a common occurrence in cases of closed head injuries. In 212 patients operated on, it was found 101 times, while the number of patients with all types of intracranial hemorrhage was 102. It is particularly common in patients who survive but are not recovering. Of 19 of these patients who submitted to air encephalography, air was seen in the subdural space on the second day in 17, and in all these the characteristic fluid was found at operation. Pneumoencephalography is very helpful in these cases. The pictures taken immediately may reveal some abnormality of the brain, and the second-day pictures taken in the erect position may show the fluid level and that air has accumulated in the subdural space. Such an appearance is evidence of excessive amounts of fluid in the subdural space. Such fluid accumulations can produce or exaggerate various post-traumatic symptoms, such as headache, lack of concentration, impairment of memory, dizziness, irritability and the defeatist attitude so marked in some patients after a head injury. If excessive fluid is shown in the subdural space by the second-day encephalogram, it should be removed through burr-holes in the skull.

Lancet, London

2:997-1046 (Dec. 1) 1951

The Power of Words. V. B. Carter.—p. 997.
*Treatment of Arterial Hypertension with Veriloid (Veratrum Viride). R. Kauntze and J. Trounce.—p. 1002.
Polymer-Fume Fever. D. K. Harris.—p. 1008.
*Diuretic Effect of Isotonic Saline Solution Compared with That of Water: Influence of Diurnal Rhythm. G. Blomhert, J. Gerbrandy, J. A. Molhuysen and others.—p. 1011.
Variations in Response to Relaxant Drugs. J. W. Dundee and T. C. Gray.—p. 1015.
Myasthenia Gravis and Malignant Exophthalmos: Report of Case. H. Zondek and A. Ticho.—p. 1018.
Haemoglobinuria in Typhoid Fever Treated with Chloramphenicol. C. E. G. Smith.—p. 1020.
Correlation of Height and Weight in Early Childhood. H. V. Muhsam. —p. 1021.

Veratrum Viride in Treatment of Hypertension.—"Veriloid," a stable and potent mixture of ester alkaloids of veratrum viride, was given orally to seven men and seven women with hypertension for periods up to 11 months. The hypertension was of the essential type in nine patients and of the malignant type in one. In two it resulted from chronic pyelonephritis, and in two others from chronic nephritis. In all the hypertension was severe and, except in one case, it was associated with symptoms. The patients' ages ranged from 19 to 62. The results in four of the patients, one with chronic nephritis, one with chronic pyelonephritis and two with essential hypertension, have been outstanding. The patient with chronic nephritis was observed for 11 months, during which withdrawal of "veriloid" was followed by return of the blood pressure to former levels and an attack of encephalopathy. Control was re-established on resumption of

"veriloid" therapy. The other three patients of this group of four were treated for more than three months. Each of these patients was young, and the dosage was about 12 mg. daily, except in one for whom 26 mg. daily was necessary. In four other patients, one with malignant and three with essential hypertension, the treatment with "veriloid" failed. One patient with chronic pyelonephritis died of renal failure although toxic symptoms were an ever-present difficulty, hypertensive crises were averted with "veriloid." One youth of 19 with chronic nephritis and hypertensive encephalopathy died a month after discharge from a cerebral vascular accident. Although the outcome of his disease was uninfluenced by the drug, he obtained much symptomatic relief. Of the four remaining patients who had essential hypertension, three were benefited, but in the other one hypertension progressed despite treatment. The authors conclude that "veriloid" by mouth will lower the blood pressure in about two-thirds of patients with hypertension. In half of these the therapeutic level may so closely approach the toxic level as to make its daily use in nonhospitalized patients unsuitable, so that the drug is a satisfactory hypotensive agent for 20 to 30% of patients with hypertension.

Diuretic Effect of Isotonic Sodium Chloride Solution and of Water.—Blomhert and associates compared the diuretic effect of isotonic sodium chloride solution, administered orally or intravenously in a short time, with the diuretic effect of equal amounts of water. Owing to the diurnal excretory rhythm different reactions at different periods of the 24 hours could be expected, and experiments were made both by day and by night, mostly in healthy male students. In the daytime diuresis after drinking of two liters of water was complete, the average output being 2,026 ml. in four hours. During the night only 70% of this amount was excreted in the same time. The diuretic response to 2 liters of isotonic sodium chloride solution administered orally or intravenously in one hour by day was diphasic. In the first hour and a half the diuresis was like that seen after the drinking of plain water; about 750 ml. of urine with a low chloride content was excreted in two hours, and a protracted mild saline diuresis followed. During the night the response to the drinking of 2 liters of sodium chloride solution was restricted to a brief water diuresis (average 630 ml.). All the solution given intravenously was retained. These facts may help to explain the onset of cardiac asthma at night. After the intake of sodium chloride solution a temporary increase (average 350 ml. or 18%) in the volume of circulating blood plasma, as manifested by a dilution of hemoglobin and serum proteins, and an increase in central venous pressure were found. Comparison of these experimental data with clinical observations suggests that secretion of antidiuretic hormone depends not only on the osmotic pressure of the body-fluids but also on the circulation. In an addendum to this report the authors direct attention to a recent report in an American publication in which Strausz and co-workers describe the production of a "water diuresis" by intravenous injection of sodium chloride solution. This diuretic response was found only in recumbent subjects.

Medical Journal of Australia, Sydney

2:581-612 (Nov. 3) 1951

Rheumatoid Arthritis. S. Nelson.—p. 581.
Orthopaedic Aspects of Rheumatoid Arthritis. G. Colvin.—p. 585.
Modern Trends in Radiotherapy. A. G. S. Cooper.—p. 588.
Obstetric Emergencies Following Deliveries. D. F. Lawson.—p. 592.
Ascariasis in Sydney Children and Its Relation to Urban Backyard. T. C. Backhouse and A. J. Bearup.—p. 595.
Virus Isolated from Case Resembling Epidemic Pleurodynia: Preliminary Report. D. W. Howes.—p. 597.

2:613-656 (Nov. 10) 1951

*Histopathological Study of 11 Cases of Poliomyelitis, Including One in the Newborn. M. Fowler.—p. 613.
Transmission of Contagious Ecthyma from Sheep to Man. V. M. Pask, I. M. Mackerras, A. K. Sutherland and G. C. Simmons.—p. 628.
Rupture of Liver in the Newborn. F. Arden.—p. 632.

Histopathological Study of Poliomyelitis.—This study is based on an examination of material obtained from 10 of the 20 individuals who died in the 1947-1948 epidemic in South Australia. The brains of five patients and the brains, cords, and various peripheral ganglions from the remaining five patients were examined. The olfactory bulbs were available in all cases. Many of the infections were bulbar in type and some patients died early in the disease. The author confirmed many of the pathological observations reported by earlier investigators, but in addition he stresses the following points: 1. Involvement of the basal nuclei of the pons, although moderate, is not uncommon. 2. Lesions on the periphery of the red nucleus tend to be more frequent on the medial borders. 3. Purkinje's cells are not completely spared from destructive changes. 4. Betz's cells are not the only components of the motor cortex destroyed; in some areas they were spared, although the smaller pyramidal neurons were involved. 5. All layers except layer 1 of the motor cortex were affected; layers 5 and 6 were affected most commonly. Entry of virus from the tonsillopharyngeal region in the bulbar cases was suggested by the nature of the lesions in the nucleus ambiguus. Whether motor or sensory fibers participate in the transfer of virus is equivocal, although circumstantially it is more likely that the latter are involved. The lesions in the medulla oblongata are not necessarily uniform, being modified by such factors as the route of invasion. There is some basis for the belief that virus, in the absence of symptoms of the disease, may exist in the nervous system without histological evidence. On the other hand, there is only meager evidence that in patients with paralysis neurons of known susceptibility may harbor virus in the absence of microscopic change. Lesions in peripheral ganglions cannot be considered evidence that the virus enters by way of peripheral nerves without more rigid criteria than some currently in vogue. Massive pulmonary embolism is a rare complication of poliomyelitis, but in one case might have been prevented by passive massage without joint movements. A previously unobserved form of polioencephalitis of the brain stem, thought to be poliomyelitis, is described. It was unusual because of the age of the patient, who died 13 days after birth, and because the necrotic lesions of the neurons were not associated with a mesodermal reaction.

Medicina, Buenos Aires

11:283-344 (Oct.) 1951. **Partial Index**

*Ten Years of Premarital Examination. T. Padilla and A. Speroni.—p. 283.
*Action of Ultrasound on Spleen. R. R. Santoro and G. F. Sommersguter.—p. 290.
Clinical Value of Modifications of the QT Interval. M. Klotzman.—p. 294.
Simplified Method for Obtaining the Thyroid Cytological Coefficient Used in Determination of Thyrotropin. E. Del Conte and J. F. E. Vasena.—p. 312.

Premarital Examination for Syphilis.—A law requiring premarital examination of men but not women for venereal disease was enacted in Argentina in 1939. Syphilitic chancre, syphilids, chancroid, transmissible gonorrhea, venereal lymphogranuloma, venereal granuloma, and papilloma are considered legal obstacles to marriage, which is not permitted until the candidate becomes non-infectious. Premarital examination was made on 5,204 men in the Hospital de Clínicas of Buenos Aires from 1940 to 1949 inclusive. The Wassermann and Kahn tests gave strongly positive results in 87 candidates. In the same decade 264,648 marriages took place in Buenos Aires. From these figures it was calculated that 5,072 individuals in Buenos Aires and 25,000 individuals in Argentina get married with positive reactions for syphilis. An inquiry among three groups of persons showed that only 47% of medical students, 49% of clerks, and 41% of workmen had knowledge of the law and understood its meaning. A total of 9,890 routine Kahn and Wassermann tests were made in the aforementioned hospital in the five years from 1945 to 1950. Positive results for syphilis were obtained in 6.14% in men and in 7.42% in women. An inquiry was made among white collar girls and among women working in factories to determine whether they wished to be included in the law requiring premarital examination for syphilis. All women in both groups answered in the affirmative. The authors suggest reform of the law to include women.

Effect of Ultrasounds on Spleen.—The spleens of four normal rabbits were exposed to ultrasonic irradiation through the shaved skin. Two additional rabbits were used as controls. The irradiations were given at a power level of 40 watts for 15 minutes

every other day up to a total of 20 applications. The irradiated animals had pronounced leukopenia, but the number and resistance of the erythrocytes were normal. The spleens of the irradiated animals were grossly of same size and form as those of the controls. Histologically, however, they showed a great increase of red pulp and diminution of white pulp, with a decrease in the number and size of the lymphatic nodules, which in certain zones had entirely disappeared. This was due to the destruction of lymphoblasts and young lymphocytes, which are very sensitive to the effects of ultrasound.

Nordisk Medicin, Stockholm

46:1513-1552 (Oct. 10) 1951. **Partial Index**

Treatment of Pregnancy Toxemia: Results from St. Erik's Hospital 1942-1948. G. Nordenstrahl and L. Werkö.—p. 1519.
*Tuberculous Salpingitis: Clinical Study of 61 Cases. G. Berggren. —p. 1522.
Genital Tuberculosis and Pregnancy. S. Kullander.—p. 1527.
Teratoma Operated on Immediately After Birth. A. Sjövall.—p. 1531.
Talcum Powder Granuloma in Abdomen. B. G. Wallerström.—p. 1532.

Tuberculous Salpingitis.—Berggren's 61 cases of histologically verified tuberculous salpingitis comprise 40 cases of manifest tuberculous salpingitis and 21 cases of latent tuberculous salpingitis, the latter treated surgically for sterility. Operation was done in 38 cases of the first group; it was contraindicated in two. In operation on the tuberculous genital organs all diseased tissue was removed and as much ovarian tissue as possible was retained. Streptomycin was applied in four cases, apparently with good effect in two. Follow-up of the 54 surviving patients from 3 months to 12 years after discharge showed that in 32 of the 33 patients in the first group the genital tuberculosis had healed, but two had progressive pulmonary tuberculosis. Of the 21 in the second group, 20 had recovered without complications; the remaining patient was later treated with streptomycin and subsequently operated on, with recovery. Surgical treatment of latent tuberculous salpingitis did not affect sterility. The author believes that with streptomycin and other antibiotics and agents such as *p*-aminosalicylic acid (PAS) the treatment of tuberculous salpingitis will in the near future become more conservative.

Philippine Medical Association Journal, Manila

27:543-590 (Sept.) 1951

Cases of Pericarditis Autopsied in College of Medicine from January, 1947, to May, 1950. A. G. Sison, L. Gomez, P. C. Campos and R. A. Apostol.—p. 543.
Aureomycin Therapy in Acute Infectious Hepatitis with Jaundice. R. W. Kalmansohn, E. A. Cleve and F. W. Pruitt.—p. 549.
Present Status of Immunization. Fe del Mundo.—p. 554.
Progress of Orthopedics in Philippines. J. S. Santillan and D. J. Tablan. —p. 558.
Concise Pharmacology of Some Drugs Used in Ocular Therapeutics. R. Guevara.—p. 563.

Presse Médicale, Paris

59:1533-1564 (Nov. 21) 1951. **Partial Index**

*Present-Day Treatment of Cutaneous Tuberculosis. C. Huriez.—p. 1538.
Modern Treatment of Chronic Purulent Pleurisy. H. Métras, M. Warnery, M. Grégoire and others.—p. 1554.

Present-Day Treatment of Cutaneous Tuberculosis.—The author observed 230 cases of cutaneous tuberculosis in the neighborhood of Lille from 1941 to 1951. Chest roentgenograms of 120 patients were studied. One-half showed no abnormalities on roentgenograms, one-fourth had lymph node involvement following thoracic disease, and one-fourth showed pleuropulmonary lesions. There were 129 women and 101 men among these patients. The influence of insufficient sunshine may be seen in the fact that 33% of the men were miners. More than half of the patients had contracted their skin lesions before the age of 20; 39% between 20 and 60 years, and only 4% after 60. Skin lesions were of the following types: lupus vulgaris, 141; verrucous, 23; ulcerovegetating, 17; scrofuloderma, 26; local tumors, 2; tuberculids, 21. Definite cure of lupus vulgaris was rare before the introduction of Charpy's method; since its introduction, about one-third of the patients are cured, one-third are apparently cured but have relapses, and one-third are not improved. Charpy's method brings about clinical stabilization rather than genuine biological cure. Fair results are obtained with streptomycin alone or in combination with *p*-aminosalicylic acid and other agents. The author began to use these forms of treatment successively two years ago and has since obtained a higher proportion (55%) of complete cures than he did by either method alone. His technique consists of an initial treatment with antibiotics (1 gm. of streptomycin with 15 to 20 gm. of *p*-aminosalicylic acid daily) for two months, followed by treatment with vitamin D_2 (calciferol), one 15-mg. ampule of "sterogyl" every week, for six months. Cure is apparently brought about by the walling-off of the tuberculous areas by fibrosis. This process seems to be the same whether it takes place spontaneously or as a result of the administration of vitamin D_2 or antibiotics. Large doses of vitamin D_2 play a major part in the treatment of lupus vulgaris; nonlupous conditions benefit more from streptomycin and *p*-aminosalicylic acid. The successive use of these drugs, however, produces the largest proportion of cures in all forms of cutaneous tuberculosis.

Proceedings of Royal Society of Medicine, London

44:905-982 (Nov.) 1951. **Partial Index**

Epidemiological Aspects of Work of World Health Organization. Y. Biraud.—p. 905.
Abnormal Function of Upper Urinary Tract. J. C. Anderson.—p. 925.
Psychosomatic Medicine and Psychotherapy. E. Kretschmer.—p. 965.
Some Biochemical Aspects of Hypoglycaemic Coma. A. S. Thorley and W. W. Kay.—p. 969.

Schweizerische medizinische Wochenschrift, Basel

81:1141-1164 (Nov. 24) 1951. **Partial Index**

*Masked Iron Deficiency, a Significant Factor in Patients with Dumping Syndrome After Gastrectomy. B. Jasiński and W. Ott.—p. 1141.
Nosology of Epicondylitis Humeri Lateralis. W. Belart.—p. 1145.
Significance of Carboxylase for Metabolism and Treatment. S. Markees. —p. 1145.

Iron Deficiency in Dumping Syndrome After Gastrectomy.—The authors investigated the iron metabolism of 39 patients with the postgastrectomy dumping syndrome and of 6 patients with peptic ulcer who complained of fatigue, headache, palpitation, and other symptoms not characteristic of peptic ulcer. They reasoned that the symptoms in all these patients might be due to an iron deficiency since: (1) patients with peptic ulcer have chronic blood loss before operation, (2) resection of the stomach alters the anatomic and physiologic conditions in the upper gastrointestinal tract so that absorption and reabsorption of ordinary amounts of iron from food are interfered with, and (3) the resultant iron deficiency may produce symptoms by interfering with tissue metabolism, through a reduction in iron-containing cytochrome and ferritin without producing a significant decrease in hemoglobin. Their studies confirmed their suspicions. With three exceptions their patients did not have frank anemia, and most of them had normal fasting serum levels, but 40 of the 45 had abnormal responses to the iron tolerance test. In this test eight 0.2 gm. tablets of ferrous gluconate (176 mg. of iron) are given orally to the fasting patient and the iron content of the serum is determined before and one, three, and seven hours after the injection. Normally there is little or no evidence of iron absorption, but in iron deficient patients the serum iron level rises sharply. In this series all but five patients showed pronounced increases in serum iron to levels of 200 to 300 γ per 100 cc. Iron therapy then was instituted with 2 tablets of ferrous gluconate three times daily for three months. Complete freedom from symptoms, including disappearance of refractory diarrhea, resulted in 14 patients. Fatigue, headache, and palpitation disappeared gradually in an additional 15 patients. The remaining patients were therapeutic failures. The iron metabolism of patients subjected to gastrectomy and of patients with peptic ulcer should be studied carefully. If gastrectomy is performed during the phase of negative iron balance, one may assume that iron deficiency disease will develop with a dumping syndrome as its clinical manifestation. The incidence of the dumping syndrome, the mechanism of which is still poorly understood, may be decreased by attention to this factor.

V 14
1952

BOOK REVIEWS

Health in Schools. Twentieth Yearbook. Second edition. Cloth. $4. Pp. 477, with illustrations. American Association of School Administrators, department of National Education Association of United States, 1201 16th St., N.W., Washington 6, D. C., 1951.

As is suggested in the foreword, this volume is an important companion piece for "Health Education," in which the N. E. A. also has a part, not only because it provides necessary information for school administration but also because it completely orients administrators to school health matters that might otherwise remain exclusively at the teaching level. The special commission responsible for this extensively revised edition is composed of top flight workers in education and health education, who had the assistance of other highly qualified persons from related fields, such as physical education and dentistry. The result is a volume that provides background and recommendations that the administrator can put to practical, profitable use.

Proceeding from the general to the specific, the volume considers the overall problem in two preliminary chapters and then gives detailed attention to major topics, including school environment, mental health, physical education, health appraisal and counseling, communicable and noncommunicable diseases, school health emergencies, and the consolidation of school and community interests in health activities. There is a special chapter on sources and resources that contains a wealth of suggestions, with each chapter of the book treated from this angle. There is also a special section listing government and private agencies from which related material or information can be obtained. In a novel final three-page discussion headed "Mr. Superintendent—*Your* Health," administrators are reminded that they too are only human. Each chapter concludes with a list of selected references and a page of pointed questions that drive home the main ideas considered in the chapter. In the introduction, John L. Bracken, who was chairman of the commission that prepared the last Yearbook in 1942, analyzes the changing situation and the important contributions of this new edition.

Autopsy Diagnosis and Technic. By Otto Saphir, M.D., Clinical Professor of Pathology, University of Illinois Medical School, Chicago. Foreword by Ludvig Hektoen, M.D. Third edition. Cloth. $6. Pp. 471, with 80 illustrations. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16, 1951.

This popular book not only deals with the technique and legal implications of autopsy but also provides useful information concerning the diagnosis and evaluation of autopsy observations. It is a valuable supplement to the standard textbooks of pathology, and can be of great help to the beginner who is looking for quick orientation and guidance in a confusing field. Each region of the body is considered separately. The author's clear and facile diction in dealing with a dry subject deserves special comment. The book has proved its value to the student, to the practitioner who is occasionally called upon to perform an autopsy, and to the young pathologist, as evidenced by its appearance in a revised and enlarged third edition. Consideration of morphological characteristics in pathological diagnosis and establishment of the cause of death is emphasized more in this edition than in previous ones. New knowledge in the field of pathology, especially in endocrine, renal, and bone diseases, is fully considered. In addition to recommended dissection by removal of organ systems *in toto*, a modified Virchow's method of removal and dissection of individual organs is also described. Performance of autopsies on embalmed and decomposed bodies is discussed. The author has included a chapter on practical suggestions for quick orientation. This edition is even more commendable than the previous ones, and it deserves to be read by everyone concerned with performance of autopsies and interpretation of autopsy observations.

The reviews here published have been prepared by competent authorities and do not represent the opinions of any official bodies unless specifically stated.

Cost of Medical Care: The Expenditures for Medical Care of 455 Families in the San Francisco Bay Area, 1947-1948. By Emily H. Huntington. Issued under auspices of Heller Committee for Research in Social Economics, University of California. Paper. $2.50. Pp. 146. University of California Press, Berkeley 4; Cambridge University Press, Bentley House, 200 Euston Rd., London, N.W.1, 1951.

The Heller Committee for Research in Social Economics of the University of California has presented a study of the expenditures for medical care of 455 moderate income families in the San Francisco Bay area in 1947-1948. After extensive analysis of the expenditures for medical care, the composition of the families, the illnesses for which medical care was required, the types of medical care required, and the amount of prepayment coverage, this report concludes that expenditures for medical care can be burdensome and sometimes disastrous and that "the only way that real protection can be accomplished is through a system of compulsory health insurance at least for the low- and moderate-income groups in our population."

This conclusion is not supported by the findings of the study. The great majority of the families studied had medical expenditures that could not be called disastrous in relation to their income. The most common illnesses were colds and influenza. In approximately 75% of the reported illnesses the bill was less than $50. Childbirth costs were the largest single item of medical expense for the group as a whole as well as for those families in which a child was born during the year.

The author states that while 60% of the families had some form of health insurance, voluntary insurance was inadequate because its coverage was concentrated on hospitalized illness. Two-thirds of the families with health insurance were covered for hospitalized illness. The study, however, shows that the hospitalized illnesses are the costly ones for which families want protection. Seventy per cent of the costly illnesses were hospitalized in contrast with only about 10% of all illnesses. The report states, "the more expensive illnesses were those most likely to receive prepaid care." Of course, it is desirable that other medical costs be covered, but in something as new as the development of voluntary health insurance, it is only logical that the first plans introduced would be designed to meet the costs of the most burdensome illnesses. More and more plans offering other types of health insurance are being introduced. In fact, since 1947, the first year during which the Heller study was conducted, hospitalization coverage in the United States has increased 46%, surgical coverage 108%, and medical coverage 143%. On the basis of these figures and on the basis of the findings of the Heller report itself, the author is hardly justified in stating that "voluntary health insurance has been tried and found wanting, and that it is not likely in the future to give insurance protection to those who need it most." On the contrary, it has proved to be the most effective method of meeting medical costs, and it is rapidly reaching more and more individuals. It is unfortunate that the conclusions of the author are inconsistent with the study itself, since the study does contain valuable information that could greatly contribute to the literature on medical care costs.

A Manual of Orthoptics. By Julia E. Lancaster, M.A. Cloth. $5.50. Pp. 199. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 49 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto, 2B, 1951.

Written by one of America's leading orthoptic technicians, this book brings a sane, conservative viewpoint into the field of orthoptics. It should do much to bridge the gap between the orthoptic nihilists and those whose overenthusiastic optimism has brought discredit to the entire field of fusion training. For the diagnosis of various forms of muscular imbalance and for indications for their surgical correction, the reader is referred to standard textbooks on ophthalmology. The author wisely confines herself to the psychological and technical aspects of the subject that must be mastered by the successful technician.

Orthoptics is defined as "that portion of ophthalmology which deals with helping the patient to get the best possible use of his

two eyes." Great emphasis is placed on the establishment of rapport between the child and the technician. The latter must understand the mental processes of the patient as related to orthoptic progress. The first part of the book, dealing largely with philosophical and psychological aspects, reveals a depth of understanding that could be studied with profit by members of any profession who work with children. The second part of the book is concerned with techniques and has chapters on orthoptic analysis, breaking down suppression, teaching convergence control, teaching divergence control, accommodative squint, anomalous correspondence, and orthoptics for adults. This volume should be required reading for every orthoptic technician. The ophthmalogist will find in it a better understanding of the true place of orthoptics as an ophthalmologic adjunct.

Immuno-Catalysis and Related Fields of Bacteriology and Biochemistry. By M. G. Sevag, Ph.D., Associate Professor, Department of Bacteriology, School of Medicine, University of Pennsylvania, Philadelphia. With preface by Stuart Mudd, M.A., M.D., Professor of Bacteriology, School of Medicine, University of Pennsylvania. Second edition. Cloth. $12. Pp. 547, with illustrations. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 49 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto, 2B, 1951.

Interrelationships between phenomena of immunity and biocatalysis have been noted for some years. In fact, Ehrlich derived his famous lock and key simile for the expression of the specificity of antibody with respect to antigen from enzyme specificity studies of Emil Fischer. In general, however, workers in the field of enzymology have given little, if any, consideration to the possible relations among the fields of biochemistry, immunology, and bacteriology. The fullness of integration among these fields is indicated for the first time in this text. Specialists in either enzymology or immunology will consider the first three sections of this book to be a reservoir of experimental facts, considered with insight and interrelated with remarkable synthesis. The pharmacologically active enzymes indigenous to plants, pathogenic bacteria, and snake venoms are considered in detail, with references to the relation between their chemical activities in vitro and their pharmacodynamic actions in vivo. The production of a specific immunity considered against this array of data leads the reader to the conclusion that many of the diverse symptoms and lesions of infectious diseases can be explained in terms of the actions of biocatalysts. In fact, the present tendency is to explain these symptoms as special manifestations of enzyme action. The many recent chemical and pharmacologic studies with lecithinases, proteoses, and nucleases of snake venom are only a few of the more pertinent indications of this trend.

Teachers and investigators concerned with the mechanisms involved in infectious diseases will find in this work an augmented source of information. There has been no apparent attempt to restrict or limit the use of references; these are grouped in a bibliography at the end of the book.

Essentials of Pharmacology. By Frances K. Oldham, Ph.D., M.D., Research Associate in Pharmacology, University of Chicago, Chicago, F. E. Kelsey, Ph.D., Associate Professor of Pharmacology, University of Chicago, and E. M. K. Geiling, Ph.D., M.D., Frank P. Hixon Distinguished Service Professor and Chairman of Department of Pharmacology, University of Chicago. Second edition. Cloth. $5. Pp. 462, with illustrations. J. B. Lippincott Company, 227-231 S. Sixth St., Philadelphia 5; Aldine House, 10-13 Bedford St., London, W.C.2; 2083 Guy St., Montreal 1951.

This edition of this introductory text in pharmacology is similar in purpose and style to the first. The new edition differs from the old chiefly in that recent changes in the field have been included, necessitating, particularly, revision of the material on autonomic blocking drugs, antibiotics, antihistaminics, and radioactive isotopes. The authors discuss the subject material of a course in pharmacology directed to medical students or practicing physicians. To accomplish this, they have omitted much of the fundamental material relating to pharmacologic principles as well as to the pharmacodynamics of most drugs. In the preface they admit to this shortcoming and state that for such details the reader must look elsewhere. In most instances satisfactory references are given to pertinent review articles or publications. There are a number of typographical errors in the book, and there is a lack of consistency in the use of synonymous drug names that is apt to cause some confusion; however, in spite of these criticisms, the volume provides a brief survey in pharmacology that should be of value to the student or physician.

Pathology of the Fetus and the Newborn. By Edith L. Potter, M.D., Ph.D., Associate Professor of Pathology, Department of Obstetrics and Gynecology, University of Chicago, Chicago. Cloth. $19. Pp. 574, with 601 illustrations. Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, 1952.

Dr. Potter is interested in the fetus as it develops in the uterus and in the infant as it adapts, after birth, to a new environment and a new type of existence. During the time that material for this book was collected, over 6,000 autopsies were performed at the Chicago Lying-in Hospital on infants and fetuses that died in that hospital and other places; tissues from over 3,000 additional autopsies performed elsewhere by pathologists from the Chicago Department of Health were also examined.

Dr. Potter points out that the pathology of the fetus and young infant has, until recently, been neglected. The pathological changes that occur during the infant's brief life are often meager and are sometimes overlooked by the inexperienced investigator. This volume was prepared to help those who are attempting to discover the causes of nonsurvival and to stimulate interest in those who have the opportunity and the material with which to work. There are 28 chapters that cover every aspect of the pathology of the fetus and the newborn infant.

It is difficult to analyze individual chapters, because they are all important. The author has covered her subject so completely and so accurately that no serious error can be detected. The vast amount of material is discussed in an interesting style. At the end of each chapter, there is an excellent list of references. On the whole, the book is an outstanding accomplishment and will remain a classic for many years. The publishers also are to be highly complimented. The paper is of excellent quality; the type is clear; the illustrations are beautifully reproduced; and the binding is sturdy. This book will be valuable to obstetricians, pediatricians, pathologists, and teratologists.

A Textbook of Medicine. Edited by Russell L. Cecil, M.D., ScD., and Robert F. Loeb, M.D., Bard Professor of Medicine, Columbia University, New York. Associate editors: Alexander B. Gutman, M.D., Professor of Medicine, Columbia University, New York; Walsh McDermott, M.D., Associate Professor of Medicine, Cornell University, New York; Harold G. Wolff, M.D., Associate Professor of Medicine (Neurology), Cornell University, New York. Eighth edition. Cloth. $12. Pp. 1627, with 204 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftesbury Ave., London, W.C.2, 1951.

This is a thoroughly revised edition of one of the classical teaching textbooks of medicine. The editors have accomplished the seemingly impossible task of including more subject matter, in the form of twenty new treatises, and shortening the text by 8%. This has been accomplished by the complete rewriting of many sections. Diseases have been regrouped according to etiology and the basic physiological, biochemical, and pathological factors discussed. Psychosomatic aspects are not neglected. Therapeutics are conservatively and generally handled. This is a thoroughly satisfactory textbook of medicine, excellent for teaching medical students or as a ready standard reference volume for the physician.

From Dugout to Hilltop. By Margaret R. Stewart, M.D. Cloth. $3.75. Pp. 233. Murray & Gee, Inc., Culver City, Calif., 1951.

This is the autobiography of one of America's pioneer women physicians, the first woman to be commissioned by the Public Health Service and the first woman to attain the rank of senior surgeon. Particularly interesting are the early chapters in which the author describes her mother's struggle to raise a large brood of children on a Nebraska homestead. Other chapters describe her experiences in medical school and internship in California, and during her post-graduate study at the Women's Medical College of Pennsylvania, her private practice in the West, and her 25 years in government service.

V 14
1952

QUERIES AND MINOR NOTES

PAINFUL FEET

TO THE EDITOR:—*For many years I have had pain over the heads of my metatarsals and have been able to stand for decreasing periods of time. There is a callus under my second metatarsophalangeal joint, and that is where most of the pain is. I have tried bars and arch supports with slight relief. Standing causes pain, but when walking, I have very little pain. Recently I stood for a whole day on a concrete floor that was covered with sand to a depth of an inch or more, but when it became necessary to remove the sand, my feet immediately became painful. Crepe-soled shoes afford considerable relief, and if a felt lift is added under the great toes the relief is increased. I have two pairs of shoes that have crepe soles, and they have a soft, plastic substance in the insoles, which have molded to my feet and have hardened. When wearing these shoes, I am relieved of some pain, but I can not wear them for office use, and I am unable to find another pair of shoes with this substance in the insoles. Can you tell me where I can get this kind of shoe? This is a serious condition, and any help will be appreciated.*

M.D., Texas.

ANSWER.—The description of the symptoms suggests a metatarsalgia with a painful callus associated with pes valgo planus. This is usually secondary to foot strain of long standing. Having a shoe that fits exactly to the foot does give relief, but offers no means of improving the condition. To correct the condition, it would be necessary to bring the foot into normal position and to learn to use it normally again. (See Hauser, E. D. S.: Diseases of the Foot, Philadelphia, W. B. Saunders Company, 1939, pp. 48, 65.) The form fitting type of shoe is made commercially by the Conformal Shoe Company, 1509 Washington Ave., St. Louis 3, Mo.

SYPHILOPHOBIA

TO THE EDITOR:—*A 30-year-old white man has been in perfect health all his life. He has been married for six years, and his blood test was negative prior to marriage. In May, he had extramarital sexual intercourse with a girl who allegedly infected two men at that time. Since early June, he claims to have soreness around his genitalia and in his mouth. The three physicians who examined him found no physical manifestations of any venereal disease, and all three made blood tests with negative results, the last one being made late in July. On August 5, he was examined again and found to be completely normal; his blood test (Kahn qualitative) was also negative. Is it advisable to treat this man prophylactically after his contact has been found to be infected with syphilis, even though this cannot be determined for several weeks? If this man does not insist on prophylactic treatment, is it permissible to omit treatment and have him observed for lesions and serologic blood tests?* *O. Hoke, M.D., Durham, N. C.*

ANSWER.—This man apparently has syphilophobia, with the development of so-called conscious symptoms: the soreness in the mouth and genitalia. The basis for this view is that had he acquired syphilis after exposure in May, there ordinarily would have been some sign of it by August. Therefore, antisyphilitic treatment is not required. However, he should be examined at frequent intervals for some months; at the same time every effort should be made to rid him of his fears. There are some physicians who feel that if such efforts fail, he might be given treatment with repository penicillin for early syphilis as a psychotherapeutic measure, provided there is some chance that this treatment will eradicate his phobia. Others suggest that placebo injections of sterile water would be equally effective.

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any official bodies unless specifically stated in the reply. Anonymous communications and queries on postal cards cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

CHROMIUM DERMATITIS

TO THE EDITOR:—*Is there any protective or preventive measure against the irritant effect on the hands caused by the chromic acid preparation used in the engraving industry? It produces dermatitis venenata with blisters and pruritis. Gloves cannot be used, since fine stencil work must be done in the process. Would an ointment or preparation of BAL be effective? Can one be desensitized to the chromic acid preparation causing the irritation? Is there an agent that, when applied to the hands, will leave a residue capable of neutralizing the ill-effects of the irritant?*

Bernard J. Schaffer, M.D., Chicago, Ill.

ANSWER.—Skin protection in the employment described is difficult, since ordinary water-repelling greasy barrier creams transfer fingerprints to the product. The chromium compounds utilized are oxidized with difficulty. The best approach is through frequent lavings in weak reducing agents, such as a 5% sodium hyposulfite solution. A weak ascorbic acid solution may be still better. The Lithographic Technical Foundation (1800 S. Prairie Ave., Chicago 16) has long advocated the application of weak solutions of citrates and tartrates. While chromates will attack the unbroken skin, the injured skin is far more vulnerable. No worker with open skin lesions should be permitted to undergo exposure. Individual susceptibility and sensitization are important. Planned desensitization is rarely practical, but spontaneous desensitization occurs commonly. By no means are all chromium compounds equally active in irritant properties. Valence determines degree of possible damage.

TESTOSTERONE AND CHRONIC PROSTATITIS

TO THE EDITOR:—*A white man, 35 years old, has chronic prostatitis. For one year previously, he has been given testosterone at monthly intervals, by injection. The dosage is not known. What is the effect of the testosterone on the prostate gland from the physiological and cytological standpoints? Would continued use of testosterone alter his libido? A complete urologic examination, including cystoscopy with retrograde studies, revealed only chronic prostatitis.*

Frank M. Hilpert, M.D., Racine, Wis.

ANSWER.—Testosterone has little or no effect on the physiology or cytology of the prostate gland of a noncastrated male, 35 years old. It is of no value in the treatment of chronic prostatitis. It is not clearly stated whether the patient's libido is decreased, but, if so, the administration of testosterone in a man of this age with normal testicular function usually does not restore it. Impotency in a normal young man usually is dependent on psychological factors and is not caused by chronic inflammation of the prostate gland.

TACHYCARDIA AND ANTIHISTAMINES

TO THE EDITOR:—*I have noticed extreme tachycardia in young persons who have taken antihistamine preparations, seasonally, for several years, for hay fever. Extensive cardiac study revealed no abnormality. Is this a coincidence or a result of the antihistamines?*

Donald F. DeMoose, M.D., Holbrook, Ariz.

ANSWER.—The chief effect of the antihistamines on the cardiovascular system is that of excitation. Tachycardia and palpitation are commonly observed after the excessive or prolonged use of these drugs. Excitatory phenomena are especially likely to occur in children, young adults, and in highly nervous persons. Precordial distress and arrhythmia have also been observed. Mackmull, G. (*J. Allergy* **19**:365 [Nov.] 1948), in studying the effect of diphenhydramine (benadryl®) hydrochloride administered intravenously to normal subjects, reported electrocardiographic changes of significance following the intravenous administration of 200 to 300 mg. of the drug.

TREATMENT OF MYOPIA

To the Editor:—*After administration of a cycloplegic, the following results were obtained. The corrections that subjectively gave the best reading for a 9-year-old girl were right eye, 2.25 sph. and left eye, 1.50 sph. The most favorable corrections for an 11-year-old girl were right eye, 1.00 sph., and left eye, 1.00 sph. These girls have never worn glasses. Should their vision be corrected? If so, should they be given the correction that will enable them to read a poor 20/20? Should they wear glasses most of the time or just for distance? Are there any therapeutic suggestions other than glasses?*

Richard L. Fruin, M.D., Inyokern, Calif.

Answer.—The vision of these patients should be corrected to a good 20/15 if possible, not a poor 20/20, and glasses should be worn for both distance and near work. If the myopia is fully corrected, the eye is artificially emmetropic. Without corrective lenses, the myopic eye accommodates very little, if at all. With corrective lenses, accommodation is necessary for looking at near objects. Accommodating may cause the patient some difficulty for near work, and the glasses may be removed because it is more comfortable to read without them. This feeling will pass. Removal of the lenses for near work defeats their purpose. Forcing the myopic eye to accommodate encourages the use of the ciliary muscle, which is essential for the proper physiological action of the eye; therefore, the lenses should be worn for both distance and near work.

Only corrective lenses will alleviate the symptoms of nonpathological myopia, which is due to the natural growth and development of the body. In the cases mentioned, it would be of interest to note the refractive states one year ago and compare the increase or decrease of the myopia. Aside from glasses, there are no therapeutic suggestions except good ocular hygiene, the use of adequate lighting, good reading habits, proper diet, and the maintenance of good health.

CHEST PAIN AND ANGINA PECTORIS

To the Editor:—*Since last February, a man, aged 31, has had four attacks of a knife-like pain in his chest running down the left arm, associated with pallor and nausea. A shock-like condition does not exist. Blood pressure remains 120/80, pulse normal; electrocardiograms have been negative. The only other finding is tenderness in the left intercostal space. A specialist told him he has angina pectoris, although his electrocardiogram is negative, and has told him to remain in bed for six months to a year, with absolutely no activity. The specialist advised the patient to carry a flask of whiskey with him and to take some whenever he feels an attack coming on. I would appreciate your opinion.*

Michael J. Lavin, M.D., Pontiac, Ill.

Answer.—The symptoms are not typical of angina pectoris. More details of the symptoms, however, are of importance; for example, at what times the pain is present, that is, whether on effort, at rest, on excitement, or in relation to meals. However, a normal electrocardiogram does not rule out coronary heart disease. An exercise test might be of some additional value. More extensive study to look for factors other than coronary heart disease to explain this pain would seem to be warranted.

DRYNESS OF VAGINA

To the Editor:—*A registered nurse, aged 30, complains of extreme dryness of the vagina, which began three months ago. She is the mother of two children, both delivered by cesarean section. There is nothing abnormal about her menses. The only time she notices this dryness is during intercourse, and then there is no pain, only diminished sensation. She has stopped taking douches. What could cause this sudden drying of the vaginal mucosa?*

M.D., Arkansas.

Answer.—In the absence of physical reasons for drying, that is, prolapse and relaxation, and in the absence of any drug being administered that might cause drying, reasons connected with intercourse should be suspected, namely, disinterest or failure to be properly stimulated to cause mucus secretion. In any event, if the dryness occurs only during intercourse, a small amount of lubricating jelly will usually solve the problem.

TOTAL ALOPECIA IN A CHILD

To the Editor:—*A boy, 8 years old, had a normal birth, and when he was 2 years old had a full head of hair and normal eyebrows. Now he is of average size, well nourished, has no apparent glandular defects, and has a normal I. Q. Six years ago, shortly after his mother was desperately ill with pneumonia, his hair and eyebrows began falling out, and, in a few months, he had total alopecia. His scalp has the sheen of the bald head with no hair folicles seen. Everything has been done without results. A specialist made a diagnosis of shock from his mother's severe illness as the cause. Can you suggest cause and treatment?*

O. W. Ridgeway, M.D., Indianapolis, Ind.

Answer.—There is no specific treatment for alopecia totalis, nor is there a known cause. Emotional disturbances and alopecia areata occur together so frequently that the connection cannot be disregarded. The condition may have begun as ordinary alopecia areata, and infants and children do have emotional disturbances. Endocrine abnormalities, foci of infection, visual defects, and nutritional disturbances have long been suspected, but never established, as causative factors. The prognosis is poor. Psychotherapy and stimulating measures are occasionally effective. Ultraviolet rays, massage, and vasodilating agents, such as nicotinic acid and ointments containing ammoniated mercury or histamine, are the treatments frequently employed. Permanent regrowth of hair is said to occur in about 3% of the cases.

INTERMITTENT SWELLING OF CHEEK

To the Editor:—*A 44-year-old white woman has an intermittent swelling of the right cheek. The swelling is diffuse, more pronounced on the inside, and involves the entire right cheek. The only symptom produced is a feeling of tightness in that side. It appears suddenly and lasts for varying lengths of time; however, slight fulness seems to be there at all times. This situation has existed for several months. The patient had two small calculi removed from the right submaxillary gland a few weeks prior to the onset of this swelling. She recently had an infected upper left molar tooth removed. She is now having symptoms suggesting the onset of menopause. A few years ago she was found to have a gastrointestinal allergy to certain foods. She is emotional, highstrung, and occasionally overindulges in alcohol. She also has a benign essential hypertension. Can you suggest therapy or diagnostic measures?*

L. C. Bailes, M.D., Anderson, S. C.

Answer.—The previous occurrence of calculi in a salivary gland and the behavior of the present swellings lead one to think that obstruction of the parotid gland duct by inflammation or calculus is the most likely diagnosis. Theoretically at least, it might also be possible for edema of the duct or the gland itself to be produced by an allergic reaction, which would most likely be due to a food. If other features of the case not presented in the query do not fit in with these possibilities, an angioneurotic edema of the buccal tissues may be considered. Skin tests with foods may yield a clue in such an event, but trial diets would be more reliable and direct. It is recommended that a diet containing only wheat and egg and milk products be used for about 10 days. If no relief ensues, the opposite diet, that is, a wheat-egg-milk-free diet, should be tried. If either diet improves the condition, additions can be made at about three day intervals.

TREATMENT OF CHRONIC LYMPHEDEMA

To the Editor:—*A patient, 45 years of age, had a subtotal hysterectomy in 1942. Acute thrombophlebitis of the left leg developed during her convalescence. Lymphedema has persisted since then. Can you suggest treatment?*

R. W. Kispert, M.D., Green Bay, Wis.

Answer.—At this late phase, only simple palliative measures would be beneficial. Persisting lymphedema is a frequent sequel, leaving one leg definitely larger than the other. Paravertebral sympathectomy, which often improves the circulation in the early stages, would have little value now. Such patients usually get along comfortably by keeping the limb elevated when sitting, wearing light-weight elastic stockings, taking massage, and avoiding trauma, which might produce ulceration of the limb.

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